## Brief Overview

1. The background of Khabarovsk region

Khabarovsk region is situated in the Far East of the Russian Federation and is part of the Far East Federal district. Its total area is 788.6 thousand sq. km. The territory of Khabarovsk region includes 17 administrative districts and two cities of regional submission: Khabarovsk (about 617.8 thousand people) and Komsomolsk-on-the-Amur (about 298.5 thousand people). The total number includes 7 cities, 27 towns 186 rural administrations, with the population more than 1571 thousand people, 81 % of which live in the cities. Khabarovsk region is an industrial center of the Far East region. In its economic system the most important sectors are power-intensive branch and highly-developed social sphere. The main industries include mechanical engineering and metallurgy (agricultural machineries production, power engineering industry, shipbuilding and ship repair, manufacture of the foundry equipment), nonferrous metallurgy, forestry, wood processing and pulp-and-paper, oil refining, chemical engineering and fishing industry. Also, there are two oil refineries - in the cities of Khabarovsk and Komsomolsk-on-the-Amur, which provide petroleum products for almost all the Far East economic region. The total processing capacity is 10 million t/y of crude petroleum, from which about 10 % is supplied from the Sakhalin island deposits through the oil pipeline Okha - Komsomolsk-on-the-Amur River, 90 % is delivered by railway from Siberia. The main coal-mining plant is a Joint-Stock Company "Urgalugol" with production capacity more than 2.5 million tons of coal p. a.

2. Project Description

In March, 2002 the Governor of Khabarovsk region Victor Ishayev has declared the beginning of the gas pipeline “Komsomolsk-on the-Amur River – Khabarovsk» construction of 502 km long. The gas delivery to Khabarovsk in new gas pipeline is scheduled for 2006. July, 2004: General Director of Open Joint Stock Company “Khabarovskenergo” Valery M. Levit took part in signing of Memorandum of Understanding on sales of the natural gas from Sakhalin sea deposits to the buyers of Khabarovsk region. The Memorandum was signed by the Governor of Khabarovsk Region Victor Ishayev and the President of “Exxon Neftegas Limited” company (operator of the project “Sakhalin-1”) Steve Terni. Open Joint Stock Company “Khabarovskenergo” and Open Joint Stock Company “Khabarovskkraigas” will become potential buyers of Sakhalin gas. The signed Memorandums of Understanding define terms and regulations, which will enter Purchase and Sale Agreements.

The project implementation will allow increasing the power system stability and profitability, considerably improving the ecological situation (to reduce the amount of harmful emissions into the atmosphere of the city and to the water basin of the Amur River), and also working conditions at Khabarovsk CHP-1.

3. Khabarovskenergo CHP-1

the Khabarovsk CHP-1 installed electrical capacity is 435 MW, installed heat capacity is 1200.2 Gcal/h, main fuel used is a mixture of black and brown coals. The connected heat load of heating system with hot water is 753 Gcal/h, with steam – 114 Gcal/h in 2002. Annual heat output from CHP-1 in 2002 was – 3,563,621 Gcal/y, power output – 1,571,092 MW/y. Actual annual heat output was 2,361,000 Gcal, including with steam – 124,000 Gcal. The technical personnel of CHP-1 boiler department includes up to 110 persons in shift, the operation staff and maintenance staff of the boiler department consists of 18 people. The following boilers are installed in the boiler department of the Khabarovsk CHP-1:

steam boilers – 4 boilers (No. 1-4) of the TP-170-100, 2 boilers (No. 5 and 6) of the BKZ-160-100F, 2 boilers (No. 7 and 8) of the BKZ-220-100F, 8 boilers (No. 7-16) of the BKZ-210-100F;

hot water boilers – 3 boilers (No. 18-20) of the PTVM-100.

The following turbo units are installed in the turbine department: 1 - PT/50-90/13; 1 - PT-30-90/13; 1 - T-27.5-90; 2 - PR-25-90/10/0.9; 2 - T-100-130; 1 - T-105-130.

The characteristics of the boilers and turbines are given in Annex II.

To restore the condensate losses, the CHP plant is provided with the chemical water treatment plant. The capacity of the chemical water treatment plant is 1800 t/h to make up the district heating system (heat network).

In the existing flow sheet the mixture of black and brown coal as the main and reserve fuel is used. The combustion products generated when firing coal are emitted into the atmosphere via the stack. The design flow sheet uses natural gas as the main fuel and coal – as the reserve one. As a result of switching the Khabarovsk CHP-1 to natural gas combustion while keeping the existing boiler capacity, the labor conditions and ecological situation in the city will be significantly improved - the emissions of ashes and sulfur from these boilers will be fully eliminated.The Khabarovsk CHP-1 plant will be supplied with natural gas from the shelf of the Sakhalin Island via the main gas line "Komsomolsk-on-the Amur– Khabarovsk". The proposed date of the main gas line commissioning is 2005. The Khabarovsk CHP-1 will be supplied with natural gas

via the city high-pressure gas line from the gas distribution station (GDS) No. 1. The maximum gas pressure of the gas line connected to the Khabarovsk CHP-1 is 0.6 MPa. No natural gas storage tanks are envisaged on the site of the Khabarovsk CHP-1. The natural gas pressure reduction and maitenance at the specified level in the gas supply system of the Khabarovsk CHP-1 will be provided by the equipment located on the factory-made gas distribution point (GDP).

4. Project Boundary

The project boundaries represent a list of enterprises, sites, installations and processes, which, to some extent, are associated with the project implementation and influence the GHG emissions. All GHG emissions within the project boundaries should be monitored by the project Designer and can be related to the project activity. Theoretically, the project boundaries for energy production at the CHP-1 plant can include GHG emissions associated with the production, transportation, reprocessing, distribution and combustion of fossil fuel, and distribution of the produced energy. However, such broad interpretation of the project boundaries for the present project is impracticable because all the above listed factors (besides fuel transportation) will not introduce any changes into GHG emissions when implementing the Project.

Practically, the optimal variant is the determination of the project boundaries for direct emissions associated only with energy production. The essence of the project lies in modernization and switching coal-fired boilers of the Khabarovsk CHP-1 to fire gaseous fuel while keeping the possibility of using coal as the reserve oil and implementation of the measures that will substantially increase economic and ecological efficiency of the CHP-1 operation. Switching the boilers from coal to natural gas carried out at the CHP-1 will not result in any changes in the plant circuit and operating conditions and the amount of the products supplied. Khabarovsk CHP-1 delivers power and heat to the industrial and community consumers of Khabarovsk City and is operated according to the schedule of consumers' demand. Project implementation will not change heat output (there will be no replacement) and the amount of fuel-fired at other enterprises beyond Khabarovsk CHP-1. Thus, the project boundaries include only CHP-1 plant and transportation of the amount of fuel fired only in CHP-1 plant boilers.

5. Baseline Option

The Khabarovsk CHP-1 is located in the industrial district of the Khabarovsk City. The plant supplies heat to the customers of the Southern district of the city and supplies

the electricity to the networks of the Open JSC "Khabarovskenerg". More than 70 % of the electric power is generated in the heating cycle. The main fuel is coal. The fleet life of the existing generating equipment allows its exploitation up to 2012. In this connection, the baseline options with the replacement of the existing equipment by the new equipment were not considered.

Option 1
During the period of 2006-2012, in the Khabarovsk City (Southern district), the alternative power sources (for example, municipal boiler-houses) will be commissioned. In this connection, at the CHP-1 there is a decrease of heat and electricity generation, fuel consumption and greenhouse gas emissions.

Option 2
During the period of 2006-2012, the Open JSC "Khabarovskenergo" will increase the purchases of the electricity on the Federal Wholesale Market of the Electricity and Power (FOREM), including electric power generated by the Bureisk Hydroelectric Power Plant, with the purpose of replacement of the electricity generated at the CHPs, the Khabarovsk CHP-1 included.

Option 3
During the period of 2006-2012, the replacement of the coals fired at the CHP-1 will be made by heavy oil. As a result of such replacement, with the same figures of electricity and heat generation at the CHP-1, the baseline will show less greenhouse gas emissions firing heavy oil.

Option 4
The existing equipment with adequate maintenance (Items 3.3) will be exploited in the period until 2012 to generate electricity and heat energy pursuant to the forecast, given in Items 3.2.

Selection of the baseline.
The options 1 and 3 are least probable.

Option 1. The main barrier of a development of the events within the baseline on option 1 is the low investment attractiveness of the new energy source construction. The existing energy tariffs in Khabarovsk Region provide very low profitability of

electricity and heat generation. For example, with the existing heat tariffs heat generation is unprofitable for JSC “Khabarovskenergo”. Under the totals of 2003, the incomes of the Open JSC "Khabarovskenergo" from heat sales were 76 % of the generating expenses. In combined electricity and heat generation, the profitability of generation as a whole at the Open JSC "Khabarovskenergo" in 2003 was about 2 %, and in 2002 was unprofitable.

Besides there are some secondary barriers obstructing the implementation of the project. For example, necessity in the land within the city boundaries to construct the new object, training of the operational personnel at the enterprise implementing the project, etc.

The combination of mentioned barriers makes the implementation of such projects improbable.

Option 3. The cost (in calculation per 1 ton of standard fuel) heavy oil exceeds the cost of coal as high as 1.5-2.5 time (for different types of coal) that makes option 3 economically unreasonable.

Option 2. The commissioning of capacities at the Bureisk Hydroelectric Power Plant is first of all aimed at the reliable delivery of energy to the customers of the Primorsk Territory, also with due account for the development in the Far East Region of the petrochemical, aluminum and forest industry.

The purchasing of the electricity from the FOREM, including the Bureisk Hydroelectric Power Plant, is made on the previously concluded agreements. The share of the electric power received from FOREM (balance of purchasing/sale of the electricity on /with FOREM) makes in the general balance of the Open JSC "Khabarovskenergo" of about 2-3 %.

The large-scale purchasing of the electricity by the Open JSC "Khabarovskenergo" from the FOREM (including the purpose of decreasing generation by the Khabarovsk CHP-1) is limited by the following factors (for Khabarovsk CHP-1).

More than 70 % of the electric power at the Khabarovsk CHP-1 is generated in the district heat cycle, which is the most economical mode of the CHP operation. Generation of the electric power in the condensation cycle or exploitation of the CHP equipment in the boiler-house mode impairs the overall performance of the plant. Therefore, the effect of replacing the electric power generated at the CHP by the electricity generated by the Hydroelectric Power Plant will be reduced due to lower overall performance of the CHP as a whole.

Generation of the electric power at the CHP-1 in the condensation cycle (30 %) is conditioned first of all by the necessity of covering the seasonal and diurnal load peaks. Thus, the actual values of peak loads can considerably differ from the scheduled loads. The given circumstance limits full replacement of the electricity generated in the condensation cycle by the electric power from FOREM, as the violation of the agreements of purchasing can result in the penalties.
Therefore, the given option of the development of the events within the baseline is of low probability.
The above factors limit, but not fully eliminates the increase of the share of the electric power from FOREM in the general balance of the Open JSC "Khabarovskenergo" and, as a consequence, the decrease of the share of the electric power generated at the Khabarovsk CHP-1. To eliminate the given circumstance the forecast of the generation of the electrical energy for the perspective (Items…) after consultations with the specialists from the Open JSC "Khabarovskenergo" was made based on the conservative approach.

Thus, the most probable development of the events is Option 4 adopted for the calculations of greenhouse gas emissions within the baseline given in PDD.

6. Additionallity

This test is based on the approved methodology at the Executive Board meeting 16 - Annex 1 “Tool for demonstration and assessment of additionality”.

**Step 0. Preliminary screen based on the starting date of the project activity.**

The excepted project starting date – 10/2005.
Therefore, the project will not be started before registration this project as JI project at the Supervisory Committee.
If the registration of project activity is postponed after October 2005, the project activity will not be started until project registration.

**Step 1: Identification of alternatives to the project activity consistent with current laws and regulations**

***Sub-step 1a. Define alternatives to the project activity:***

Realistic and credible alternatives that are not JI and that provide outputs or services comparable with the proposed JI project activity by 2012 are:
Use of the existing equipment of Khabarovsk CHP-1 firing coal;
CHP-1 load reduction compensated by energy sources (for example, by buying electricity from more efficient power plants connected to the JSC "Khabarovskenergo" power grid); as an extreme case CHP-1 can be switched to a heating mode operating as boiler-house.
Option (a) seems to be more realistic than (b), because it does not need introduction of any change in existing conditions of local electricity and heat supply. New heating source is problematic taking into account investment climate in the region. A disbalance in heat/power production by CHP-1 will cause overall plant efficiency decrease. That is why option (a) is considered further on. For more details of "without the Project" scenario, please, see in charter 6 of Baseline Study.

Being more realistic option (a) characterized by the following:
The lifetime of existing equipment will last over 2012 (art. 3.3 of the Baseline Study);
Power and heat production is a combined technology, which is the most efficient amongst others;
This option needs no capital investments but just maintenance.

Further on option (a) is considered. For more details of "without the Project" scenario, please, see in charter 6 of Baseline Study.

*Sub-step 1b. Enforcement of applicable laws and regulations:*

Alternative (a) fully meets the requirements of the Russian legislation on power supply and its implementation is fully under control of JSC "Khabarovskenergo" (the owner of CHP-1). JSC "Khabarovskenergo" has all necessary licenses for that.
Regulations and Standards of construction and operation of energy plants.
These documents establish standards of secure operation of plant equipment. They can have both state and sectoral status, they establish terms of inspections. Fulfillment of regulations and standards are under control of state entities (such as Gosgortechnadzor) as well as JSC "Khabarovskenergo" and executives of CHP-1. In case of non-compliance the defects (for instance, deterioration) must be eliminated.

Environmental legislation.
The Environmental legislation (both state and local requirements) establish individual emission and water discharge limits as well as payments for emissions and discharge within the limits and over the limits.
The existing CHP-1 is equipped by devices to reduce environmental impact (flue ash removal system, water discharge cleaning system, etc.). Annually states supervising environmental entities hold inspections. The instructions issued by those entities are obligatory for implementation. There are no debts for environmental payments and fees from Khabarovsk CHP-1.

The existing environmental legislation:
Federal Law "On protection of Atmosphere Air" of April 22, 1999;
The Order of the Minister of Environmental and Natural Resources of November 27, 1992 "Basic regulations of payments for emissions, water discharge and waste disposal";
Federal Law "On Environmental Protection" of December 26, 2001.

***Conclusion**: The existing mode and operational conditions of CHP-1 is most probable and realistic "without the Project" case. This alternative is in compliance with all of existing legislation and regulations requirements.*

**Step 2. Investment analysis**

*Sub-step 2a. Determine appropriate analysis method*

The simple cost analysis is applied.
Conservative net present value (NPV) was calculated for the proposed project:
with the revenue from the sale of ERUs.
with the expected cash inflow and outflow.
time period has been accepted as 2005-2019.
discount rate has been accepted 12 %.

Calculate the NPV for the proposed project including expected revenue from the sale of ERUs.

Sub-step 2b. Option I. Apply simple cost analysis

The tables with the calculations of cash flows and financial efficiency parameters for the project are submitted in Annex I.

**Conclusion: The project is not economically viable as the NPV with the sales of carbon credits is significantly larger than zero, while the NPV without the sales of carbon credits is smaller than zero. If the project is not economically viable without the sales of carbon credits, the project is not business as usual and thus can be referred as additional.**

**Step 4: Common practice analysis.**

***Sub-step 4a. Analyse other activities similar to the proposed project activity:***

Due to construction of gas-main pipeline 600 mm in diameter from Okha deposit (i. Sakhalin) to Komsomolsk-na-Amure JSC "Khabarovskenergo" has been converting boilers at Komsomolsky CHP-1, CHP-2 and CHP-3 to natural gas combustion since 1988. In 2000 the company started refurbishment of Amursk CHP-1 with boilers conversion to gas (two boilers No. 6 and 7 were switched from coal to gas).
To the date 16 power boilers of "Khabarovskenergo" power plants with total steam output 3685 t/hour have been switched to gas and are working successfully. Operation of gas firing boilers is highly reliably and efficient. Application low-excess-air burners provide low $NO_x$ and $CO_2$ emissions.

***Sub-step 4b. Discuss any similar options that are occurring:***
14 boilers were switched from coal to natural gas at the Komsomol'sk CHP-1, CHP-2 and CHP-3 during 1988-1990, 2 boilers at the Amursk CHP-1 were switched from coal to gas in 2000-2001.
Switch of 16 boilers carried out earlier does not differ from proposed project activity at the Khabarovsk CHP-1 in list of measures. But executed switch have been carried out in more favorable investment conditions because the gas price in 2001 was lower than the coal price. It made the project implementation practicable, i.e. the projects were recompensed and attractive for investment.

The fuel prices (historical and perspective data) for different periods are submitted in Annex II.

Furthermore, 14 boilers were switched to gas during Soviet period when the principles of the project implementation were diverse than at the present time. At that time the most of investment projects were carried out at the expenses of large depreciation charges included into energy tariffs. At present time the depreciation charges are not included in the energy tariffs sufficiently by Regional Energy Commissions and that is not enough for JSC "Khabarovskenergo" for implementation of the proposed project activity.

***Conclusion:*** ***Similar activities are observed, but essential distinctions between the project activity and similar activities are reasonably explained.***

**Step 5. Impact of JI registration.**

The approval and registration of the project as a JI project will be allowed to obtain the following benefits and incentives:
Anthropogenic greenhouse gas emission reductions will amount to 1300 thousand t/$CO_2$ on average during 2008-2012;
The financial benefits of the revenue obtained by selling emission reduction (including VERs and ERUs) will amount to 32.5 mln. Euro;
Revenue from the sale of emission reductions will be allowed to make the project financially attractive.

***Conclusion:*** ***All steps of Additionality test are satisfied; therefore the proposed JI project activity is not the baseline scenario.***

7. Monitoring

Within the project boundaries are Khabarovsk CHP-1 and Fuel transportation systems from fuel deposits to the plant. Emissions from fuel transportation systems can be dismissed from calculations of total emissions; thus the Monitoring Plan considers only parameters of Khabarovsk CHP-1.
The main methodology for defining GHG emissions is their calculation using fuel consumption data and emission factors for each type of fuel. Thus the fuel accounting system is the core element of GHG emission monitoring. Electricity and heat output should be also considered to define specific emissions per kWh of the equipment under

control.

8. Environment

When implementing the project of switching the boilers at Khabarovsk CHP-1 to natural gas combustion the gross emissions of sulphurous anhydride and of coal fly ash to the atmosphere will be eliminated, that will provide considerable improvement of the ecological situation not only in the City of Khabarovsk, but also in Khabarovsk Region