**JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM**
**Version 01 - in effect as of: 15 June 2006**

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## SECTION A. General description of the project

### A.1. Title of the project:

The implementation of the combined-cycle plant at Novgorod heat and power station OJSC "TGC-2", Russia
Sectoral scopes: 1. Energy industries (renewable/non-renewable sources).
Version: 02, Date: 03/10/2011

### A.2. Description of the project:

The goals and objectives of this project are to increase the utilization efficiency of the existing (factual) volume of natural gas burned at the HPS (389 ths t.f.e per year), to improve the performance indicators and increase the competitiveness of the HPS in the power market through the application of modern technologies which produce heat and electric power.

In the course of the implementation of the project the proposal is to install in the main building of the heat and power station (HPS) a gas turbine unit GTE-160 , with a waste-heat boiler which has steam parameters equal to 9 MPa (90 atm) and 500-520°C. Steam released by the waste-heat boiler is sent to the existing turbine PT-60-130/13 st.#1 transferable to lower parameters.

As a result of the proposed technical solution a combined cycle plant CCP-210 with a capacity of 210 MW will be laid out.

The CCP-210 MW operates in the base mode with an annual installed capacity of 5400 hours per year. The supply of heat from the steam turbine selection PT-60-130/13 covers the heat consumption from bleed steam and the warming of system water. All electric power delivered from the CCP-210 unit, will be sold on the open market (DAM).

Before the project began the Novgorod region was supplied with electric power by the plants of Novgorod region; 70% of the electric power was imported from the united power grid of the North West.

*Baseline scenario*

The continuation of the existing situation is regarded as the baseline scenario.

Electric power for the Novgorod region is supplied by the Novgorod HPS in the volume that can be generated at the existing facilities. The remaining volume required will be covered by the production of electric power by other electric power supply sources in the Novgorod region – from the united power grid of the North West.

Specific fuel consumption for heat output at Novgorod HPS is equal 153.9 g.f.e/Gkal.

*Project*

The Project scenario involves the installation of a GTE-160 gas turbine unit with a steam waste-heat boiler at the Novgorod HPS.

As a result of the project the new units at the Novgorod HPS built with more efficient technology will generate electric power which will replace the electric power generated by the power plants of the united power grid of the North West, which uses less effective technologies.

The specific fuel consumption for the electricity at the CCP-210 of the Novgorod HPS will be 282.4 g / kWh. The average specific fuel consumption in the united power grid of the North West is about 320 g /kWh. The implementation of the Project will result in a fuel saving at the electric power plants of the united power grid of the North West, which will lead to a correspondent reduction in the

emission of greenhouse gases and pollutants due to the reduction in the fuel burned at the HPSs and thermal power plants (HPSs).

Project will not influence at heat output from Novgorod HPS, but specific fuel consumption for heat output will change. Specific fuel consumption for heat output from CCP 110 will equal 134.8 g.f.e/Gkal.

*Project development*

The implementation of the provisions of the Kyoto Protocol within the subdivisions of the company began before the establishment of the OJSC "TGC-2" and during the period of existence of the RAO "UES of Russia".

In 2003-2004 an inventory of greenhouse gas emissions for the subdivisions of the Company for 1990-2002 was carried out by the NIEO "Energy Carbon Fund".

In the beginning of 2007 NIEO "Energy Carbon Fund" upon an agreement with the OJSC "TGC-2" which was established in February 2005, carried out an inventory of greenhouse gas emissions and potential assessment of the reduction of greenhouse gas emissions for the OJSC "TGC-2". On the basis of the results of this work recommendations were made on 5 potential joint projects, including the reconstruction of the Novgorod HPS. On the basis of these recommendations a Project Business Plan was developed which considered the Kyoto Protocol requirements. On June 6, 2007 the project was submitted for consideration by the Investment Commission of the RAO "UES of Russia" and was included in the Investment program of the holding. On June 16, 2007 at the meeting of the Board of Directors of the RAO "EES of Russia," a decision was made to enter into agreements to prepare project design documents within the bounds of Kyoto Protocol was made. On August 14, 2007 the project was approved by the Board of Directors of the OJSC "TGC-2" and the company began to implement the project.

The new facilities are planned to be brought into service in 2011.

Thus, the implementation of the project will lead to a reduction of greenhouse gas emissions of 171,095 t $CO_2$ from 2011- 2012.

## A.3. Project participants:

| Party involved | Legal entity project participants (as applicable) | Please indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|---|---|---|
| Party A - Russian Federation (Host party) | Open Joint Stock Company "Territorial Generating Company # 2" (OJSC "TGC-2") | No |
| Party B | - | No |

## A.4. Technical description of the project:

### A.4.1. Location of the project:

The Russian Federation

**A.4.1.1. Host Party(ies):**

The Russian Federation

**A.4.1.2. Region/State/Province etc.:**

The Novgorod Region.

Area - 55.3 square kilometers (3.3% of the North-West Federal District, and 0.3% of Russia). The region comprises 21 districts, 2 city districts, 3 towns of regional jurisdiction, 7 towns of district jurisdiction, 22 industrial communities. It is located in the north-west of the Russian Plain. It is bordered by the Leningrad, Vologda, Tver, Pskov regions.

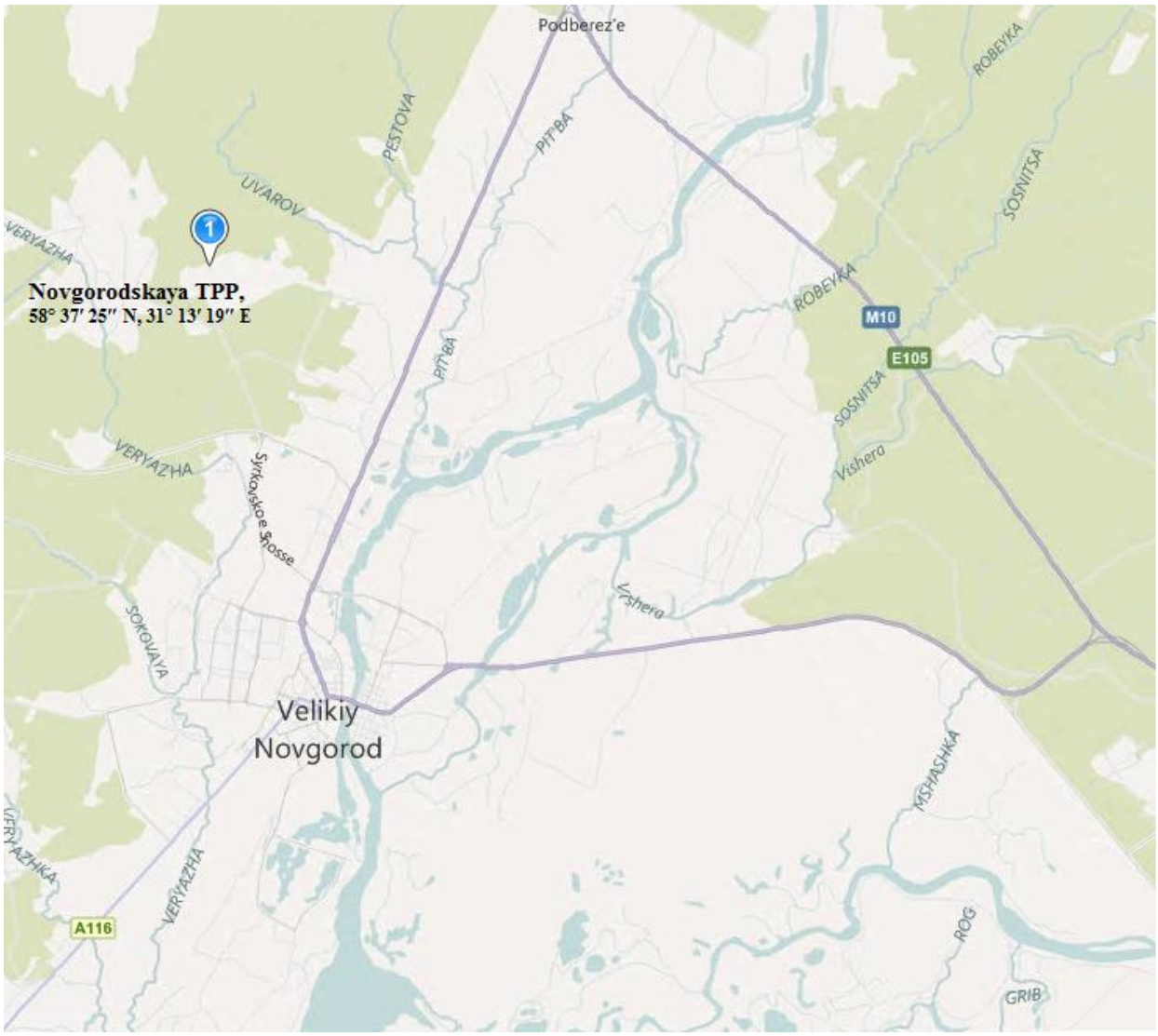
The distance from Novgorod to Moscow: 606 km. The population of the region: 740 thousand people. (4.91% of the North-West Federal District, 0.47% of the population of Russia). Major industries: precision engineering and metalworking (electronic industry, radio industry, instrumentation, chemical engineering), chemicals – LLC AKRON (synthetic resins, plastics, mineral fertilizers), timber, the consumer industry, the glass and porcelain industry, food processing.


**A.4.1.3. City/Town/Community etc.:**

Veliky Novgorod is the administrative center of the area, located on both sides of the upstream valley of the Volkhov river in the North-Eastern part of the region, 600 km from Moscow. The population is about 220 thousand people.

**A.4.1.4. Detail of physical location, including information allowing the unique identification of the project (maximum one page):**

The project is being implemented in Veliky Novgorod, at the Novgorod HPS. The Novgorod HPS is located 14 km north of Veliky Novgorod.




**Picture A.4.1.4.1. Location of the Project.**

The Novgorod HPS is a structural part of the Main Directorate of the OJSC "Territorial Generating Company No.2" in the Novgorod region. The installed electric capacity of the Novgorod HPS:

- electric 190 MW,
- thermal 630 Gcal/hour, including the turbines 512 Gcal/hour.

The following equipment is installed at the Novgorod HPS:

- four TP-87 steam power boilers produced by the TCP "Krasny Kotelschik,"
- PT 60-130/13 steam turbine No.1 produced by LMZ,
- P 50-130/13 steam turbine No.2 produced by LMZ,
- PT 80/100-130/13 steam turbine produced by LMZ.

The nominal parameters of steam: pressure 130 kgs/cm2, temperature 545 OC.

The installed electric capacity of the Novgorod HPS is 190 MW (available energy in winter - 140MW), and the installed thermal capacity is 630 Gcal/hour).

The Novgorod HPS is almost the only large producer and supplier of electric power in the Novgorod region. The Electric power output is 685 mln.kWh. All the electric power produced at the Novgorod HPS is sold on the wholesale electric power market. The Novgorod HPS provides 20% of the consumers of Novgorod region with electric power.

Heat delivery in hot water is made by the OJSC AKRON through two pipelines - Du 500.

The connection of the Novgorod HPS with the distribution networks of the Novgorod region is made through two overhead 100 kV power transmission lines and one 110 kV cable line.

Except for the 110 kV lines, power delivery is made from the MSG- 6 kV at generator voltage by direct consumer feeders (26 feeders at the OJSC AKRON, and 2 feeders at the COJSC NMZ).

**A.4.2. Technology(ies) to be employed, or measures, operations or actions to be implemented by the project:**

During the implementation of the project it is proposed that in the main building of theHPS a gas turbine unit GTE-160 will be installed, with a steam waste-heat boiler for steam parameters 9 MPa (90 atm) and 500-520 °C. The steam produced by the waste-heat boiler is directed to an existing turbine PT-60-130/13 № 1, transferable to lower parameters.

The CCP- 210 includes:

• a gas turbine unit GTE-160 with a unit capacity of 160 MW with a TZFG 160-2 MU3 generator produced by the OJSC "Power Machines";

• a P-137 vertical waste-heat boiler manufactured by the OJSC IK ZIOMAR;

• a steam turbine № 1reconstructured by the OJSC Uralenergoremont. After reconstruction turbine No. 1 will be marked: steam turbine PT-50-9, 0 / 1, 28.

The steam-power part of the power unit includes two pressure circuits.

During the implementation of the project it is proposed that a GTE 160 MW will be utilized. This is produced by OJSC “Power machines” under license of Siemens out of V94.2 adjusted GTU components. The GTE-160 is a single-shaft, single-cylinder unit with a working speed of 3000 rpm and is suitable for operation on gaseous (natural gas) and fuel oil.

The main characteristics of the turbine are specified in the table below:

| Parameters, items | GTE-160, |
|---|---|
| Electric capacity, nom. /max, MW | 157 |
| Efficiency factor | 34.4 |
| Designed gas calorific capacity, kJ/kg | 50056 |
| GTU pressure ratio | 11.3 |
| Gas flow at GTU outlet, kg/ | 509 |
| Air from before the compressor, kg/sec | 504 |
| Required gas pressure before the GTU, MPa | 3.0 |
| Gas temperature outside combustion chamber, °C | 1125 |
| Gas temperature outside the GT, °C | 545 |
| Number of turbine revolutions, r.p.m. | 3000 |
| Emissions Nox, mg/nm3 | 50 |
| Weight, t | 295 |
| Size of GTE, m | 18.1x12.5x7.5 |

**Waste-heat boiler**

The waste-heat boiler (WB) is equivalent to the P-90 designed to work as a part of the CCP (the final design of the boiler will be determined at the design stage) to produce high-pressure and low-pressure steam and warm water by recycling exhaust gases at the GTE-160.

Single vertical, forced circulation evaporation in the contours of high and low pressure. The regulation of steam pressure and temperature is not provided - it works on variable parameters.

The WB length (Depth) is about 31.0 m. The installation height of the drums is about 23.0 m.

The service life of the boiler is 40 years in the basic mode, and 30 years in the peak-load mode. The approximate weight of the boiler is 2000 tons.

The WB is equipped with a system of regulation, technological protection and blocking - the ACPS. The automatic process control system (APCS) is a part of the CCP management system. The layout of the waste-heat boiler is as follows:

The WB has its own housing which includes components from the flue gas flange at the diffuser of the GTU and including heating surfaces to the upper flange of the WB pipe and basic equipment of the feedwater system. The WB has a gas-tight inner lining, designed for pressurized gas; that is why the passage points of the pipelines through the lining are equipped with special seals.

The outer WB insulation (attached to the gas-tight liner) keeps the temperature of the outer surface at not more than 55 ° C. The WB is designed for 7-points seismic resistance on the MSK-64 scale.

Natural gas for the CCP-210 is utilized within the actual annual consumption. The unit is supposed to work in the basic mode. The delivery of heat from bleeds of the steam turbine is aimed at covering the heat consumption with bleed steam and the warming of network water. All the electric power delivered from the block will be sold at the DAM.
The flow capacity of the existing pipelines can satisfy the HPS demand for natural gas under any loads. Currently, the supply of natural gas is made through two pipelines with a pressure of 6 and 25 kgf/cm2. The flow capacity of the pipelines PG-6 and GRP-1 is 60 ths.nm3/hour, and pipelines PG-25 and EMG-2 - 120 ths.nm3/hour.

The presence of a gas pipeline pressure of 25 kgf/cm2 at the Novgorod HPS eliminates the need for a gas booster station during the construction of the GTE-160.
The GTE-160 is equipped with a generator T3FG-160.

To provide the electric power generation of the unit it will be required to construct an OSG-330 kW HPS and an OHL-330 kV-330 kV from the OSG-330 kV HPS to the substation.

**Project implementation schedule**

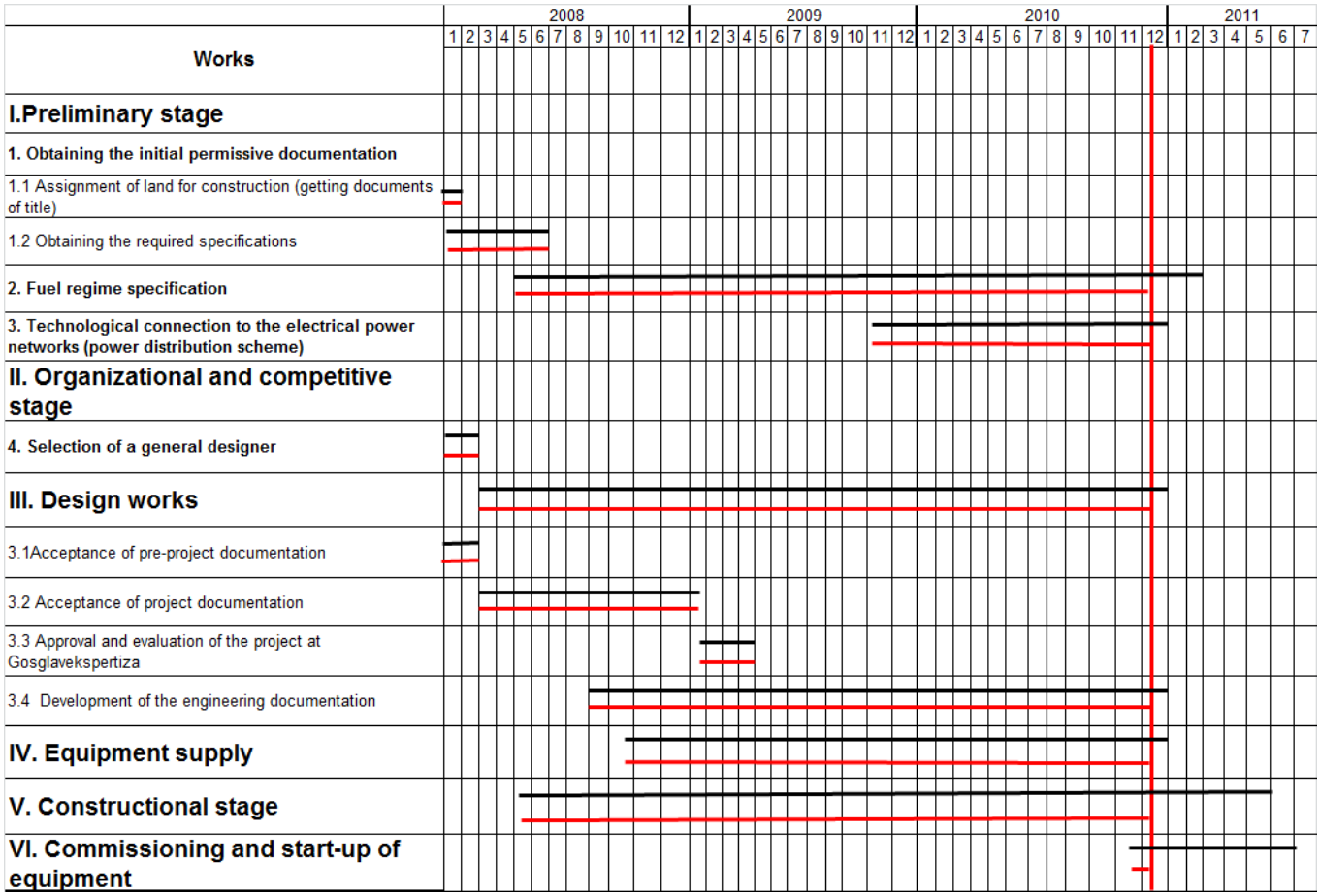

2008
2009
2010
2011
1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7
Works
I.Preliminary stage
1. Obtaining the initial permissive documentation
1.1 Assignment of land for construction (getting documents of title)
1.2 Obtaining the required specifications
2. Fuel regime specification
3. Technological connection to the electrical power networks (power distribution scheme)
II. Organizational and competitive stage
4. Selection of a general designer
III. Design works
3.1Acceptance of pre-project documentation
3.2 Acceptance of project documentation
3.3 Approval and evaluation of the project at Gosglavekspertiza
3.4 Development of the engineering documentation
IV. Equipment supply
V. Constructional stage
VI. Commissioning and start-up of equipment

Table A-2 Performance indicators of the CCP-210.

| **Average annual rates** | **Measuring unit** | **Value** |
|---|---|---|
| Unit electric power | MW | 160 |
| Thermal capacity (designed) of the unit | Gcal/h | 139 |
| Amount of electric power generated by the unit | ths. MWh | 1.235 |
| Auxiliaries | ths. MWh | 0.081 |
| Amount of electric power delivered | ths. MWh | 1.154 |
| Delivery of heat energy from collectors | ths.Gcal | 241.476 |
| Including: heat consumption for auxiliaries | ths.Gcal | 0 |
| Productive supply of thermal power from the HPS | ths.Gcal | 241.476 |
| Annual consumption of natural fuel for the unit | mln nm³ | 313.63 |
| Annual consumption of natural fuel for the unit | ths tfe | 358.434 |
| Fuel caloric value | kcal/nm³ | 8000 |
| Average annual specific consumption of fuel equivalent for the electric power delivered | gfe/kWh | 282.4 |
| Average annual specific consumption of fuel equivalent for the thermal power delivered | kgfe/Gcal | 134.8 |

**A.4.3. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI project, including why the emission reductions would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:**

The implementation of the project will lead to the generation of additional electric power at the Novgorod HPS through the installation of the CCP-210, as well as the replacement of the electric energy output at the turbine PT-60. The CCP 210 will annually deliver 1235 ths MWh with a specific fuel consumption for electric energy generation equal to 282 gfe/kWh, which corresponds to a GHG emission rate of 0.464 t $CO_2$/MWh. Electric power generated by the CCP-210 will replace the electric power that would have been generated by the PT-60 turbine at the Novgorod HPS and electric power plants of the united power grid of the North West. The specific fuel consumption at the existing facilities of the Novgorod HPS is 391 gfe/kWh. The GHG emission rate in the united power grid of the North West is 0.548 t $CO_2$/MWh.

Thus, due to the lower efficiency factor, the turbine and network electric power plants (in comparison with the efficiency factor of the CCP-210) will require more fuel for the generation of electric power at the electric power plants of the united power grid of the North West. As a result, greenhouse gas emissions will be reduced due to a reduction in the amount of organic fuel burned in the united power grid of the North West.

**A.4.3.1. Estimated amount of emission reductions over the crediting period:**

| | Years |
|---|---|
| Length of the crediting period: **2011-2012** | **1.5** |
| Year | Estimate of annual emission reductions in tonnes of $CO_2$ equivalent |
| 2011 | 55382 |
| 2012 | 115713 |
| Total estimated emission reductions over the crediting period (tones of $CO_2$ equivalent) | 171095 |
| Annual average of emission reductions over the crediting period (tones of $CO_2$ equivalent) | 114063 |

**A.5. Project approval by the Parties involved:**

On October 28, 2009 the Government of the Russian Federation adopted a Regulation "On the measures to be taken for the realization of Article 6 of the Kyoto protocol to the UN FCCC on climatic change"[1]. This document stated the Provision on the realization of Article 6 of the Kyoto Protocol.
In accordance with clause 8 of the Provision the projects shall be approved by the Ministry of Economic Development of the RF on the basis of the results of the competitive election of applications. The competitive selection of applications will be carried out by the carbon units operator (Sberbank of Russia) in accordance with clause 5 of the Regulation of the RF government No. 843.

[1] Regulation of the Government of the RF No.843 from 28.10.2009 - http://www.government.ru/gov/results/8030/

The order of the Ministry of economic development "On the adoption of the regulations for the competitive selection of applications for the approval of the projects in accordance with Article 6 of the Kyoto Protocol to the UN Framework Convention on climatic change"[2] determines the requirements in respect of the composition and content of an application. "A positive expert judgment on the project documentation made in accordance with the international requirements by an independent entity elected by the applicant" should be included in the application.

Thus, in accordance with the legislation of the RF regarding the implementation of JI projects, a project may only be approved after the positive judgment of a determiner is obtained.

The project approval by a Party involved other than the host Party is absent at the time of the determination. The party involved other than the host Party will be determined after the approved by the Ministry of Economic Development and Trade of the Russian Federation.

[2] Order of the Ministry of Economic Development No. 485 from 23.11.2009 - http://merit.consultant.ru/doc.asp?ID=10297

## SECTION B. Baseline

### B.1. Description and justification of the baseline chosen:

A description and substantiation of the chosen baseline will be made with the use of JI specific approach, based on the "Guidelines for users of the JI PDD form " (version 04) and in accordance with Appendix B and the "Guidance on criteria for baseline setting and monitoring" through the following steps:

Step. 1. Indication and description of the approach chosen regarding the baseline setting.

Step. 2. Application of the approach chosen.

These steps are described in more detail below.

Step 1. Indication and description of the approach chosen regarding the baseline setting.

The baseline is determined through the consideration of various alternative developments, including the proposed project activity. The key factors will be identified as the criteria for selecting the baseline scenario. All the alternatives will be considered from the point of view of the impact these factors have on them. An alternative scenario on which the key factors have the least negative impact will be selected as the baseline.

Thus, the following stages of selecting a baseline are expected:

- Description of the alternatives
- Description of the key factors.
- Analysis of the influence of the key factors on these alternatives.
- Selection of the most feasible alternative case.

Step 2. Application of the approach chosen..

Description of possible alternative scenarios.

We consider the following scenarios as alternatives:

***Alternative scenario 1.*** Continuation of the current situation (no project activity): electric power at the Novgorod HPS is produced with the PT-turbine, at the same level.

This alternative implies that PT-60 turbine of the Novgorod HPS will operate as before, using the existing equipment, and will generate electric power at the level prior to the project. The remaining amount of electricity needed will be generated by power plants of the united power grid of the North West.

Table B 1.1. Supply of electricity from the Novgorod HPS for alternative scenario 1.

| | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|
| Delivery of electric energy from | 259.9 | 43.5 | 93.4 | 132.3 | 132.3 |

| | | | | | |
|---|---|---|---|---|---|
| turbines PT-60 (mln kWh) | | | | | |

***Alternative Scenario 2***. Realization of the project without it being registered as a JI activity - installation of the gas turbine unit GTE-160 with a steam waste-heat boiler working for the existing turbine PT-60-130/13 at the Novgorod HPS.

The project implies the installation of a gas turbine unit GTE-160, with the waste-heat boiler having steam parameters equal to 9 MPa (90 atm) and 500-520 °C. The steam thrown by the waste-heat boiler is sent to the existing turbine PT-60-130/13 st.#1, transferable to lower parameters. As a result the combined cycle plant, the CCP-210 will be laid out which will allow an additional 1235 mln kWh to be generated annually at the Novgorod HPS. The CCP-210 has good performance indicators, the specific fuel consumption for electric supply is 282,4 gfe/kWh. The additional electricity generation at the Novgorod HPS will replace the generation of electricity by the separate turbine PT-60 and power plants of the united power grid of the North West with the worse performance indicators and the consequent greater fuel consumption for electricity generation.

Table B 1.2. Supply of electricity from the CCP-210 for alternative scenario 2.

| | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|
| Supply of electricity from buses | 0 | 0 | 0 | 572.2 | 1154 |

***Alternative Scenario 3.*** Implementation of the project using equipment, other than the CCP-210.

This alternative scenario implies the installation of additional equipment at the Novgorod HPS, other than the CCP-210. As a result, additional electricity will be generated at the Novgorod HPS.

Below are the equipment options to consider.

| Options | Model | Model of GT/PT | Producer of GT/PT | Electric capacity, MW | Efficiency coefficient of CCP,% | Nominal capacity of GT/PT, MW | CCP scheme |
|---|---|---|---|---|---|---|---|
| Option 1 | CCP-230 | GTE-160/ K-80 | LMZ/LMZ | 240 | 51.2 | 160/80 | 1GT+1PT |
| Option 2 | CCP-225 | GTE-160/ T-65/75 | LMZ/LMZ | 230 | 51.1 | 160/65 | 1GT+1PT |
| Option 3 | CCP-270 | GTE-180/ K-100 | LMZ/LMZ | 270 | 55.3 | 173/94 | 1GT+1PT |

None of the stated alternatives contradicts the currently effective laws and they may be considered in the further analysis.

*Description of the key factors and analysis of the impact of the key factors on these alternatives.*

The baseline will be defined, taking into account the following key factors that influence the selection of the development scenarios for electricity generation at the Novgorod HPS:

- Preservation of industrial steam selection with the parameters 12 kgs/cm, 250°C
- Economic efficiency of the implementation of the alternative case.

- Sectoral reform policies and legislation;
- Economic situation and availability of funds (including investment barrier ),price of fuel;
- Local availability of technologies, equipment, experience and know-how;

According to the working conditions of the Novgorod HPS, it is required to provide industrial consumers with steam from industrial extractions with certain parameters and hot water to meet hot-water supply requirements. The influence of the key factors on the stated alternative scenarios is defined through a factor analysis:

Table B1.5. Factor Analysis.

| **Factor** | Alternative 1 | Alternative 2 | Alternative 3 | Note |
|---|---|---|---|---|
| **Industrial steam bleeding with the parameters 12 kgs /cm$^2$, 250°C.** | The current situation imp lies the operation of the existing equipment which includes two P T turbines, which provide the required volume of industrial extraction of steam with the required parameters | The project installation of the CCP 210 includes the existing PT turbine; as a result the implementation of the project preserves the industrial extraction of steam with the required parameters. | **Options 1 and 3**. These options imply the K-80 and K-100 turbines as a part of the CCP. K turbines as a rule do not have industrial extraction, or there may be non-adjustable steam bleeding. Turbines with non-adjustable extraction cannot cover steam loads within the whole range of the unit cyclic-load capability. That is why CCP units with K turbines are not suitable for operation at the Novgorod HPS. **Option 2.** This option – the CCP 225 includes a T-65 turbine. The T Turbine is a heat-extraction steam turbine which does not | It is obvious that this factor has no impact on Alternatives 1 and 2. Alternative 3 is influenced by this factor. Alternative scenario 3 is excluded from further consideration. |

| | | | | |
|---|---|---|---|---|
| | | | provide industrial extraction of steam. Thus, the CCP units with K turbines are not suitable for operation at the Novgorod HPS. | |
| **Economic attractiveness of the alternative case** | This alternative corresponds to the current situation and does not require additional financial investment. In this situation the Novgorod HPS works with a fixed profit. | This alternative requires additional investment. In accordance with the efficiency criteria for investment projects specified by TGC-2, the discounted payback period should not more than 5 years. The discounted payback period for this alternative is 6.5 years (a more detailed investment analysis is given in section B.2) | - | Alternative 1 corresponds to the current situation and is not exposed to the impact of this factor.<br>Alternative 2 is not economically attractive because of the long pay-off period of the investment. |
| **Sectoral reform policies and legislation** | At the beginning of 2006 the Concept of RAO UES of Russia strategy for 2003-2008 "5+5" "Generating companies of the wholesale electricity market" was adopted. The companies founded in the course of the reform specialize in certain types of activities (electric power generation, transmittance, etc.). These companies have a larger core business than former regional monopolies: they unite the companies with the same core business either in several regions or all over Russia. Generating activities are concentrated in the two types of interregional companies: wholesale generating companies (WGC) and territorial generating companies (TGC). TGC comprise mainly combined heat-and-power plants (HPP) producing both electric and thermal power. In December 2007 – January 2008 the target structure of all the heat WGC and TGC was formed.<br>At a time when institutional reforms were being implemented the task for the staff of the companies involved was to ensure | - | All the Alternatives correspond to the sectoral policies and legislation |

| | | | | |
|---|---|---|---|---|
| | conformity with legislation. | | | |
| **Economic situation and availability of funds (including investment barrier). Price of fuel.** | Alternative 1 doesn't assume any investment activity. | The biggest share of financing source for project realization is own funds of TGC -2 – 76%. Detail investment analysis is presented in section B2. | - | |
| | In 2007 the increase in prices for natural gas corresponded to a trend estimated by the Government of the Russian Federation. The forecast for controlled gas prices until 2010 corresponds to price levels given in the protocol of the Government of the Russian Federation dated November 30, 2006. | | - | |
| **Fuel availability** | There is no need additional fuel value for the continuous of current situation. There is no problem with gas availability in the value that is necessary for Novgorod HPS operation on existing equipment. | Additional value of gas is needed for CCP 210 operation. There is organization problem exist for increasing of gas limit for Novgorod HPS. | - | This factor influence on Alternative 2. |
| **Local availability of technologies, equipment, experience and know-how.** | This alternative doesn't assume introduction of any new technologies, equipment, experience and know-how | Technology and equipment, provided in Alternative 2 are not prevalence in Russia. The total capacity of the thermal power plants in the united power network of Russia in 2007 was 153.5 GW.Thus, the proportion of combined-cycle plants was 1.8%. | - | This factor influence on Alternative 2. |

**Conclusion:**

Based on the analysis, it is obvious that the key factors favor the implementation of Alternative Scenario 1 and have a negative impact on Alternative Scenarios 2 and 3. Therefore, Alternative Scenario 1, namely *electricity generation at the Novgorod HPS using the existing equipment, at the same level* is the **baseline**.

Baseline is determined with the use of joint emission factor from the united power grid of the North-West. This parameter was established on consistency with the UNFCCC "Tool to calculate the emission factor for an electricity system" (version 02) in conservative way and taking into account uncertainties.

Baseline is determined according to following JI specific approach:

$$\mathbf{BE_y = BE_{ad\ el} + BE_{sub\ el} + BE_{heat}} \quad \textbf{(formula B.1-1)}$$

where:
**BE** $_{ad\ el}$ – emissions from the production of electric power in the united power grid of the North West according to the baseline scenario, t $CO_2$;
**BE** $_{sub\ el}$ – emissions from the production of electric power with the CCP unit replaced in accordance with the project, t $CO_2$;
**BE**$_{heat}$ – emissions from the heat production at existing equipment of Novgorod HPS, t $CO_2$;

$$\mathbf{BE_{ad\ el} = (EO_{CCP} - EO_{BE}) * EF_{grid}} \quad \textbf{(formula B.1-2)}$$

where:
**EO** $_{CCP}$ – output of electric power from the CCP, kWh;
**EF**$_{grid}$ – GHG emission rate during electric energy production in the united power grid of the North West, t $CO_2$/MWh;
**EO** $_{BE}$ – output of electric power from the CCP that replaces the output of turbine PT-60 in the absence of the project, kWh (see formula D 1.1.);

$$\mathbf{EO_{CCP} = EG_{CCP} - EC_{CCP}} \quad \textbf{(formula B.1-3)}$$

**EG**$_{CCP}$ - generation of electric power at the CCP, kWh;
**EC**$_{CCP}$ – consumption of electric power for the CCP auxiliaries, kWh

$$\mathbf{BE_{sub\ el} = EO_{BE} * SFC_{BE} * NCV_{NG} * EF_{CO2,\ NG}} \quad \textbf{(formula B.1-4)}$$

where:
**SFC**$_{BE}$ – specific fuel consumption for the generation of electric power from the Novgorod HPS according to the baseline, tfe/kWh (see formula D 1.2);
**NCV** $_{NG}$ - net calorific value of the natural gas, kcal per m3. To be converted in TJ by multiplying by 4,1868*10^-9TJ
**EF** $_{CO2,\ NG}$ - CO2 emission factor for natural gas, equals to 56,1 t CO2 per TJ

$$\mathbf{BE_{heat} = HO_{CCP} * SFC_{hBE} * COEF_{NG}}$$

Where:
**HO**$_{CCP}$ – heat output from CCP unit under the project, Gkal
**SFC**$_{hBE}$ – specific fuel consumption for heat output from the Novgorod HPS according to the baseline, gfe/Gkal;

The table below presents the key parameters and variables used to determine the baseline:

| Data/Parameter 1 | **EO** $_{BE}$ |
|---|---|
| Data unit | MWh/year |
| Description | Electricity output from the PT-60 turbine of the Novgorod HPS at the baseline. |

| | |
|---|---|
| Time of determination /monitoring | Determined once. |
| Source of data (to be) used | Calculated by the Novgorod HPS experts based on annual data from the 2008-2010 annual reports.<br>The calculation is presented in the Excel file - Annex 5. |
| Value of data applied<br>(for ex ante calculations/determinations) | 132,254 MWh/year |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The calculation is done by calculating the average electricity supply from the PT-60 turbine of the Novgorod HPS in 2008-2010. |
| QA/QC procedures (to be) applied | All calculations are based on the measured data presented in the annual reports. All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 2 | **$SFC_{BE}$** |
| Data unit | gfe/kWh |
| Description | The specific fuel consumption for the electricity output from the Novgorod HPS at the baseline. |
| Time of determination /monitoring | Determined once. |
| Source of data (to be) used | Calculated by the Novgorod HPS experts based on annual data from the 2008-2010 annual reports.<br>The calculation is presented in the Excel file - Annex 5. |
| Value of data applied<br>(for ex ante calculations/determinations) | 391 gfe/ kWh |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The calculation is done by calculating the average specific fuel consumption for the electricity output in 2008-2010. |
| QA/QC procedures (to be) applied | All calculations are based on the measured data presented in the annual reports. All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 3 | **$EO_{ad\ el}$** |
| Data unit | MWh/year |
| Description | The amount of electric power output from the CCP-210 substituting the electric power supply from the power plants of united power grid of the North West (the additional power output from the Novgorod HPS as a result of the project implementation). |
| Time of determination /monitoring | Annually |

| | |
|---|---|
| Source of data (to be) used | Calculated by the Novgorod HPS experts based on data on the electricity output from the PT-60 turbine at the baseline, and output from the CCP-210 according to the project. |
| Value of data applied (for ex ante calculations/determinations) | 2011 – 520,300 MWh<br>2012 – 1,021,728 MWh |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | All data is measured with electricity meters, the measurement results are transferred to the central server of the Automated measuring and information system for electric power fiscal accounting |
| QA/QC procedures (to be) applied | The Automated measuring and information system for electric power fiscal accountingis certified and is checked every 5 years.<br>All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 4 | **$HO_{CCP}$** |
| Data unit | Gkal/year |
| Description | Heat output from CCP unit under the project |
| Time of determination /monitoring | Every year |
| Source of data (to be) used | Report from the Automatic control system of technological process |
| Value of data applied (for ex ante calculations/determinations) | 2011– 104 652 Gkal<br>2012 – 241 476 Gkal |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Measured by measurement system[3] |
| QA/QC procedures (to be) applied | All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 5 | **$SFC_{h\,BE}$** |
| Data unit | gfe/Gkal |
| Description | The specific fuel consumption for the heat output under the Novgorod HPS at the baseline. |
| Time of determination /monitoring | Determined once. |
| Source of data (to be) used | Calculated by the Novgorod HPS experts based on annual |

[3] Information on the names of the metering devices for the CCP will be submitted later in accordance with the agreement with the OJSC "SZMA", No. 5000-2367-10 from 22.12.2010

| | |
|---|---|
| | data from the 2008-2010 annual reports.<br>The calculation is presented in the Excel file - Appendix 5. |
| Value of data applied<br>(for ex ante calculations/determinations) | 153.9 g.f.e/Gkal |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The calculation is done by calculating the average specific fuel consumption for the heat output at the Vologda HPS in 2008-2010. |
| QA/QC procedures (to be) applied | All calculations are based on the measured data presented in the annual reports. All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |
| Any comment | |

| Data/Parameter 4 | **$NCV_{NG}$** |
|---|---|
| Data unit | $Kcal/m^3$ |
| Description | Natural gas caloric value. |
| Time of determination /monitoring | Monthly |
| Source of data (to be) used | Transfer and acceptance act. |
| Value of data applied<br>(for ex ante calculations/determinations) | 8000 $Kcal/m^3$ |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Submitted once a month by the gas supplying company "Novgorodoblgaz". |
| QA/QC procedures (to be) applied | This parameter is provided with the certificate for purchased fuel, and evaluated by an independent certified laboratory. |
| Any comment | |

| Data/Parameter 5 | **$EF_{grid, CM}$** |
|---|---|
| Data unit | $tCO_2/MWh$ |
| Description | Joint emission factor from the united power grid of the North West |
| Time of determination /monitoring | Calculated once |
| Source of data | The project design documents: "Enhancement of Yuzhnaia CHP – 22 of St-Petersburg. Construction of unit #4, JSC "TGC-1", Leningrad region, Russia", http://ji.unfccc.int/UserManagement/FileStorage/436NUFJHCEVGMBT9A7DLQROWZPY1I8<br>Reference number on UNFCCC site – 0197. |
| Value of data applied<br>(for ex ante calculations/determinations) | 0.548 |

| | |
|---|---|
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The factor is estimated by Energy Carbon Fund in compliance with the approved CDM procedure "Guidelines for emission factor estimation for the power grid" (version 02) |
| QA/QC procedures (to be) applied | The project design documents: "Enhancement of Yuzhnaia CHP – 22 of St-Petersburg. Construction of unit #4, JSC "TGC-1", Leningrad region, Russia" was determined by an independent expert company: Bureau Veritas Certification Holding SAS. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 6 | **$EF_{CO2,NG}$** |
| Data unit | t $CO_2$/TJ |
| Description | $CO_2$ emission factor for natural gas combustion |
| Time of determination /monitoring | Determined once |
| Source of data | |
| Value of data applied (for ex ante calculations/determinations) | 56.1 t /TJ |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | This parameter is provided in 2006 IPCC Guidelness for National Greenhouse Gas Inventories, Table 1.4. |
| QA/QC procedures (to be) Applied | - |
| Any comment | - |

## B.2. Description of how the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the JI project:

The analysis presented in the B.1. Subsection clearly demonstrates that the proposed project is not the baseline.

To substantiate additionality, a JI specific approach is applied.

To this end, Provision a) is chosen as defined in Section 2 of Appendix I to the " Guidance on criteria for baseline setting and monitoring " (Version 03), i.e. a representation of traceable and transparent information showing that the baseline is identified on the basis of conservative assumptions and that the project activity is not a part of the identified baseline scenario and that the project will lead to the reduction in anthropogenic emissions from the sources of greenhouse gases.

This Section demonstrates that the project provides a reduction in emissions from the sources that are additional to the emissions that would occur otherwise, using the following step-by-step approach:

- The first step defines and describes the applied approach to substantiation of additionality.
- The second step applies the selected approach.

The conclusion provides an explanation of the reductions achieved in greenhouse gas emissions. The following is a detailed description of this approach.

**Step 1. Specifying and describing the approach to substantiate additionality.**

The JI specific approach is based on the explanation of the fact that the project activity could not happen in any case due to the presence of *a financial barrier,* and that this activity is not *common practice.*

**1. Financial Barrier**

The description of the financial barrier is given with the use of an investment analysis.

The investment analysis includes an evaluation of economic efficiency, and from these results a conclusion can be made about the attractiveness of the project when it is implemented without it being registered as a JI project.

The result of the investment analysis is to quantify the economic efficiency indicators such as NPV, IRR and the discounted payback period.

A sensitivity test on variables such as electricity tariffs, natural gas prices and capital investment is carried out as a part of the investment analysis.

The project is additional if it is not economically attractive without the sale of ERUs.

**2. Common Practice Analysis**

This step reinforces the research conducted at the previous stage of analysis about the extent of technology used in this project and in this region. The project is additional if it is not common practice.

**Step 2. Application of the selected approach.**

**1. Investment Analysis**

An investment analysis is conducted for Alternative Scenario 2 in order to prove the additionality of the implemented project.

Table B.2.1 shows the results of the cost-effectiveness analysis of Alternative Scenario 2.

Table B.2.1. Cost-effectiveness Indicators

| Item | Unit | Value of the project activity without the ERUs sale |
|---|---|---|
| Investments (excluding VAT) | ths rub. | 1 857 627 |
| Average annual income | ths rub/year | 3 043 875 |
| Average annual operating costs | ths rub/year | 2 168 119 |
| Average annual depreciation (not included in the cash flow analysis) | ths rub/year | 87 680 |
| Average annual income from the ERUs sales | ths rub/year | 0 |
| Discounted payback period | Years | 7.2 |

To evaluate the cost-effectiveness of the project the Regulation on Investment Activities of the OJSC "TGC-2" is used, which has been in force since 10 Nov, 2005. The methodology is based on the commonly used formulas for calculating the key financial/economic performance indicators of the investment project.
According to the Regulation on Investment Activities of the OJSC "TGC-2", the following provisions are used for the calculations:

1. The time horizon of the project is calculated as the life of the equipment plus the period of investment +2 years- 20 years.
2. The growth rate of the tariffs, fuel prices and inflationary expectations are considered in accordance with the scenario conditions of development of the electric power industry.
3. The criterion for making a decision on the project implementation is the discounted payback period. It should not exceed 5 years.

Tables showing calculations of the economic indicators in Excel format are presented in Annex 4.

**Sensitivity Test:**
Table B 2.2 Results of the Sensitivity Test

| **Item/Change** | **-10%** | **+10%** |
|---|---|---|
| **Capital investment** | | |
| Discounted payback period (years) | 6.2 | 8.2 |
| **Electricity tariff** | | |
| Discounted payback period (years) | 11.9 | 5.2 |
| **Natural gas price** | | |
| Discounted payback period (years) | 5.6 | 10.1 |

The project is most sensitive to changes in electricity tariffs. A change in the electricity tariff has the most significant impact on the discounted payback period. Changes in the investment costs influence the efficiency of the project to a lesser extent.

The project is considered sustainable if at all scenarios are effective and financially feasible. Table B2.2. shows that in 6 out of the 6 scenarios, when the key parameters of the project change, the cost-effectiveness indicators are not acceptable.

**2. Common Practice Analysis**

When taking a decision in 2007 on the installation of the CCP-210 at the Novgorod HPS, combined heat and power technologies were not widely prevalent in Russia. Then the average capacity of a CCP at the HPS of Russia was 2779 MW, or 1.8% of the total capacity of the HPS.

Table B.2.2. Putting combined cycle plants into operation in Russia in 2007

| № | Name | CCP capacity (MW) | Put into operation |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | Nevinnomyssk GRES power plant[4] | 145 | 1972 |
| 2 | GHPS of the Igolsko-Talovoe oil field[5] | 24 | End of 2004 |
| 3 | Sochi HPS[6] | 70 | 2004 |
| 4 | Dzerzhinsk HPS [7] | 195 | 2005 |
| 5 | Kaliningrad HPS[8] | 450 | 2005 |
| 6 | Tyumen HPS-1[9] | 220 | 2005 |
| 7 | North-West HPS[10] | 2*450 | 2006 |
| 8 | HPS 27[11] | 450 | 2007 |
| 9 | Ivanovo GRES power plant | 325 | 2007 |
| TOTAL | | 2779 | |
| Capacity of the power system in Russia, MW (2005)[10] | | 153500 | |
| **Share of CCP in total volume, %** | | **1.8%** | |

The total capacity of the thermal power plants in the united power network of Russia in 2007 was 153.5 GW. Thus, the proportion of combined-cycle plants was 1.8%. This fact indicates that the project to install a CCP is not common in Russia. **Conclusion**: Our analysis shows that the project is not economically attractive without the sale of ERUs. The common practice analysis shows that the Project is not common practice. Thus, the project activity is additional.

## B.3. Description of how the definition of the project boundary is applied to the project:

[4] http://www.yug.so-ups.ru/Page.aspx?IdP=84
[5] http://www.engin.ru/projects/projects_4.html,; http://www.uraltep.ru/?id=15&pid=12
[6] http://ru.wikipedia.org/wiki/%D0%A1%D0%BE%D1%87%D0%B8%D0%BD%D1%81%D0%BA%D0%B0%D1%8F_%D0%A2%D0%AD%D0%A1
[7] Functioning and development of electric power industry in the Russian Federation in 2005, APBE, Section 3, p.28
[8] http://ru.wikipedia.org/wiki/%D0%9A%D0%B0%D0%BB%D0%B8%D0%BD%D0%B8%D0%BD%D0%B3%D1%80%D0%B0%D0%B4%D1%81%D0%BA%D0%B0%D1%8F_%D0%A2%D0%AD%D0%A6-2
[9] http://www2.te.ru/appls/portal/Portal_ru.nsf/0/9DB4F1FCCFA6FEFDC5256DF3003B389E
[10] http://ru.wikipedia.org/wiki/%D0%A1%D0%B5%D0%B2%D0%B5%D1%80%D0%BE-%D0%97%D0%B0%D0%BF%D0%B0%D0%B4%D0%BD%D0%B0%D1%8F_%D0%A2%D0%AD%D0%A6
[11] Functioning and development of the electric power industry in the Russian Federation in 2007, APBE, Section 2, page 27

The Project covers sources of greenhouse gas emissions related to the project activity. The emission assessment includes greenhouse gases that considerably contribute to greenhouse gas emissions (more than 1%).

The Project covers the Novgorod HPS and the united power grid of the North West

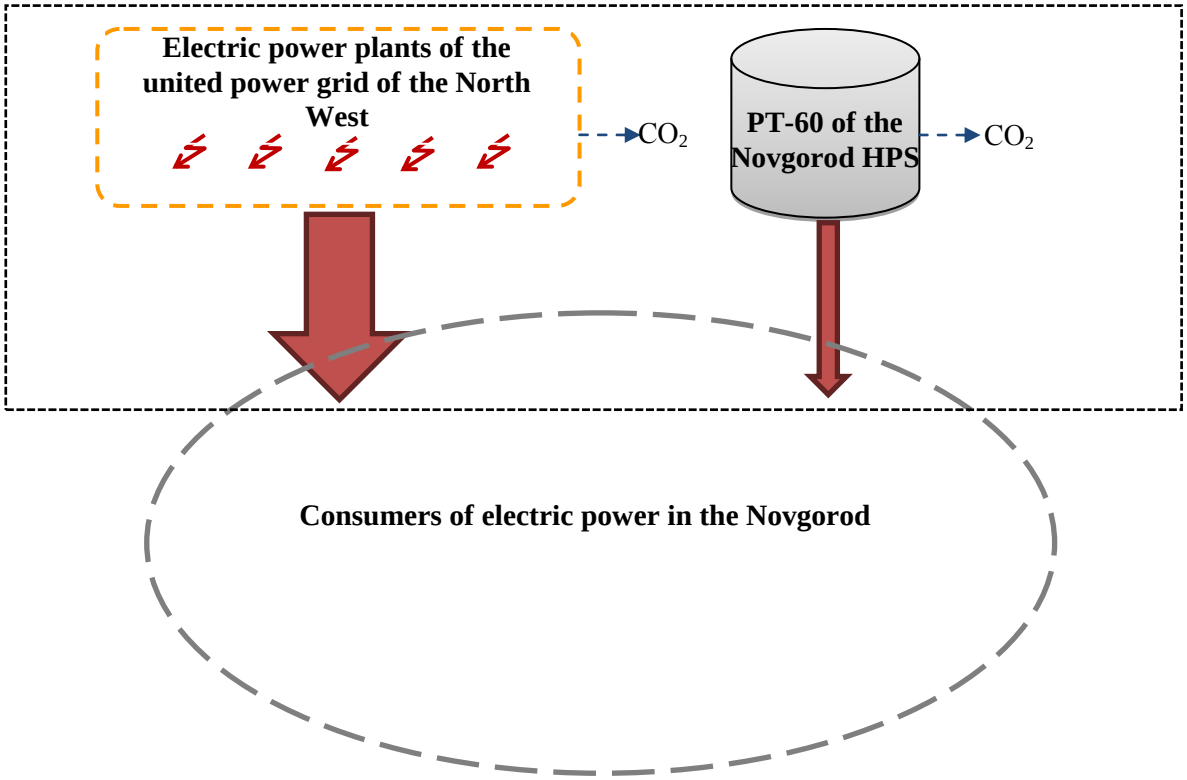
Table B 3.1: Emission sources within baseline scenario and the project activity

| | Source | Gas | Included/Not included | Grounds/explanation |
|---|---|---|---|---|
| **Baseline** | Fuel combustion for production of electric power in the united power grid of the North West | $CO_2$ | Included | Major emission source |
| | | $CH_4$ | Not included | Emissions are very insignificant. In National Greenhouse Gas Inventories, 2006, Volume 2, Chapter 2, Table 2.2, the emission factor for stationary fuel combustion in the power industry is very insignificant for $CH_4$ (on the basis of the calculations). |
| | | $N_2O$ | Not included | Emissions are very insignificant. In National Greenhouse Gas Inventories, 2006, Volume 2, Chapter 2, Table 2.2, the emission factor for stationary fuel combustion in the power industry is very insignificant for $CH_4$ (on the basis of the calculations). |
| | Fuel combustion at the Novgorod HPS | $CO_2$ | Included | Major emission source |
| | | $CH_4$ | Not included | Emissions are very insignificant. In National Greenhouse Gas Inventories, 2006, Volume 2, Chapter 2, Table 2.2, the emission factor for stationary fuel combustion in the power industry is very insignificant for $CH_4$ (on the basis of the calculations). |
| | | $N_2O$ | Not included | Emissions are very insignificant. In National Greenhouse Gas Inventories, 2006, Volume 2, Chapter 2, Table 2.2, the emission factor for stationary fuel combustion in the power industry is very insignificant for $CH_4$ (on the basis of the calculations). |

| | | | | |
|---|---|---|---|---|
| **Project** | Fuel combustion at the Novgorod HPS | $CO_2$ | Included | Major emission source |
| | | $CH_4$ | Not included | Emissions are very insignificant. In National Greenhouse Gas Inventories, 2006, Volume 2, Chapter 2, Table 2.2, the emission factor for stationary fuel combustion in the power industry is very insignificant for $CH_4$ (on the basis of the calculations). |
| | | $N_2O$ | Not included | Emissions are very insignificant. In National Greenhouse Gas Inventories, 2006, Volume 2, Chapter 2, Table 2.2, the emission factor for stationary fuel combustion in the power industry is very insignificant for $CH_4$ (on the basis of the calculations). |

On the basis of the analysis the project scope may be graphically presented as follows:

**Diagram B 3.1: Project scope for the baseline scenario**


Electric power plants of the united power grid of the North West
$CO_2$
PT-60 of the Novgorod HPS
$CO_2$
Consumers of electric power in the Novgorod

Legend:

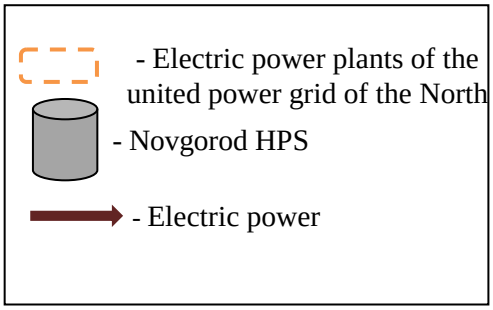
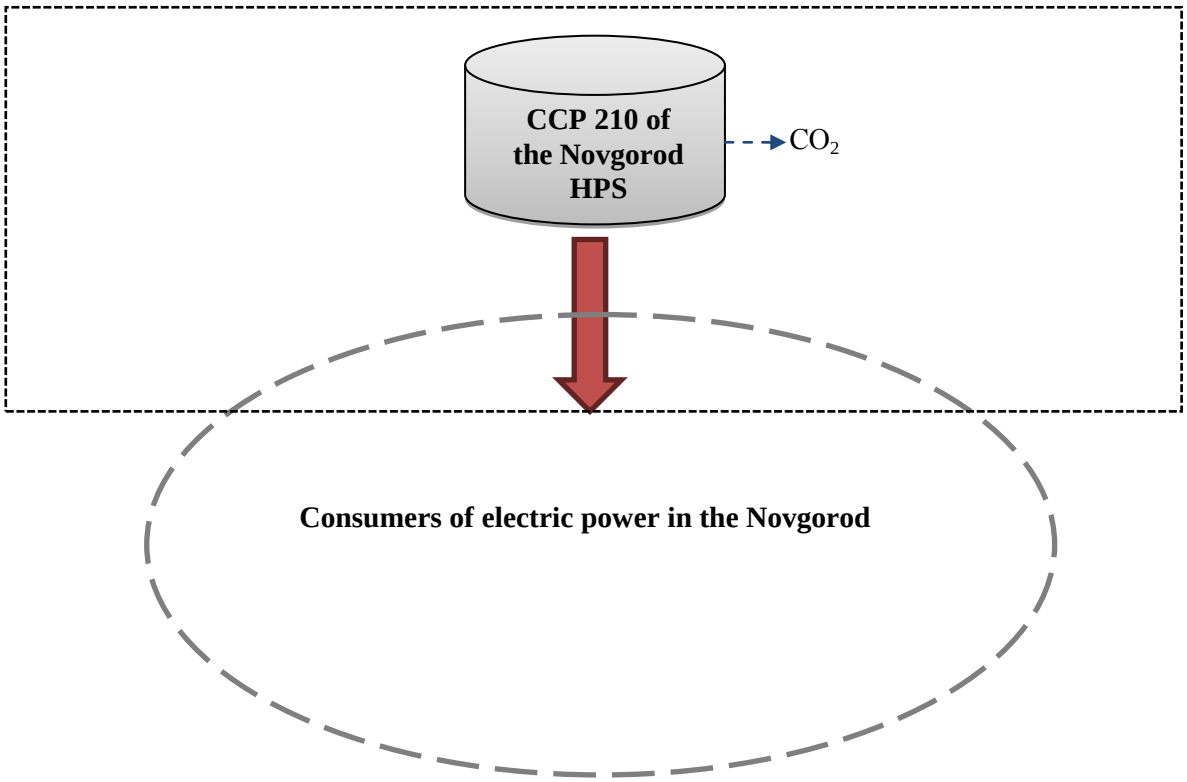
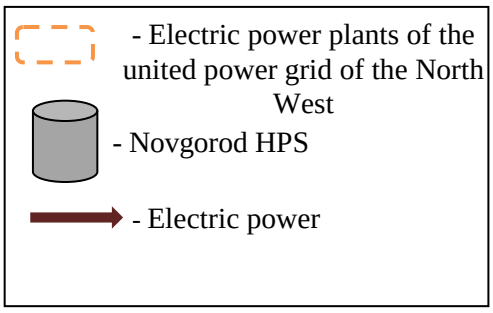

- Electric power plants of the united power grid of the North
- Novgorod HPS
- Electric power

**Diagram B 3.2: Project scope for the project scenario**




Legend:



**B.4. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:**

Date of baseline setting: 15.02.2010.

The baseline was developed by:

Closed Joint-Stock Company "National Carbon Sequestration Foundation" (Moscow);

Contact: Evgeniya Baydakova, Senior Expert of the Project Development Department;

Phone: 8 499 788 78 35 ext. 104

Fax: 8 499 788 78 35 ext. 107

e-mail: BaydakovaEV@ncsf.ru

Closed Joint-Stock Company "National Carbon Sequestration Foundation" is not the project participant.

## SECTION C. Duration of the project / crediting period

### C.1. Starting date of the project:

July 10, 2008 – beginning of work to install the CCP 210

### C.2. Expected operational lifetime of the project:

15 years or 180 months: 01.07.2011 – 30.06.2026

### C.3. Length of the crediting period:

1 year and 6 months: From 01.07.2011 to 31.12.2012

## SECTION D. Monitoring plan

### D.1. Description of monitoring plan chosen:

**1. Definition and description of monitoring approach**

The monitoring plan for this project has been worked out in accordance with JI specific approach based on the following provisions:

- Guidelines for the implementation of Article 6 of the Kyoto Protocol (Appendix B. Criteria for baseline setting and monitoring, II. Monitoring[12]
- Guidance on criteria for baseline setting and monitoring, Version 02 (D. Guidance on monitoring)[13].

This approach includes the following steps:

Step. 1. Indication and description of the chosen approach to monitoring setting.
Step. 2. Application of the chosen approach.

Below is more detailed description of the chosen approach.

**1. Indication and description of the chosen approach to monitoring setting**

In compliance with the Guidelines for Users of the JI PDD Form version 04, in section D it is necessary to examine in detail and clearly mark the data and ratios, which are:

a)Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination regarding the PDD;
b) Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), but that are not already available at the stage of determination regarding the PDD; and
c) Data and parameters that are monitored throughout the crediting period.

**2. . Application of the chosen approach.**

[12] http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=2

[13] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

The project activity implies the installation of a CCP-210 at the Novgorod HPS which leads to the replacement of the electric power produced by the PT-60 turbine which is included in the CCP 210 according to the project, and additional power output at the CCP 210. This will lead to an increase in the work efficiency of the plant. Also, additional electric power will be generated; this power will replace the electric power from the regional power network and import sources to the regional power network.

Thus, the reduction of greenhouse gas emissions is calculated by comparing the fuel consumption for the generation of an equal amount of electric power as a result of the base scenario and the Project.

The following data will be measured and calculated for monitoring purposes:

1. Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination regarding the PDD:
   - The average fuel consumption specific rates for the generation of electric power from the Novgorod HPS from 2008 to2010
   - The average fuel consumption specific rates for the output of heat power from the Novgorod HPS from 2008 to 2010
   - The average electric energy output from the PT-60 turbine from 2008 to 2010.
   - The coefficient of greenhouse gas emissions from the regional power network.
2. Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), but that are not already available at the stage of determination regarding the PDD:
   - no information available
3. Data and parameters that are monitored throughout the crediting period:
   - Electric power generation at the CCP 210
   - Electric power consumption for auxiliaries of the CCP
   - Amount of fuel consumed by the CCP-210 for electric power production
   - Heat output from the CCP-210
   - Amount of fuel consumed by the CCP-210 for heat production
   - Caloric value of the utilized natural gas

**Electric power generation for the baseline:**

An estimation of this indicator for the baseline is carried out by means of calculating the average electric power output from the PT-60 turbine in 2008-2010

$$EO_{BE} = \overline{EO_{2008-2010}}$$ **(formula D.1-1)**

where:

**EO** $_y$ – electric power output from the PT-60 turbine according to the baseline per year y (kWh);

**Specific rates**

The determination of the specific indicators for the baseline is carried out by means of calculation.

The specific consumption of natural gas for electric power production at the Novgorod HPS for the baseline SFC $_{BE}$ is calculated as the average specific fuel consumption for electric power delivered by the Novgorod HPS in 2008-2010:

$$SFC_{BE} = \frac{\overline{FC_{BE\ 2008-2010}}}{EO_{BE\ 2008-2010}}$$

**(formula D.1-2)**

where:

$\overline{FC_{BE\ 2008-2010}}$ - average fuel consumption for electric power delivered by the Novgorod HPS in 2008-2010, tfe;

$\overline{EO_{BE\ 2008-2010}}$ – average electric power output from the PT-60 turbine in 2008-2010, MWh;

The specific consumption of natural gas for electric power delivered by the CCP is calculated using the following formula:

$$SFC_{CCP} = \frac{FC_{electr\ CCP}}{EG_{CCP} - EC_{aux\ CCP}}$$

**(formula D.1-3)**

where:

**FC**$_{\text{electr CCP}}$ - consumption of natural gas at the CCP for the delivered electric power, ths m$^3$;

**EG**$_{\text{CCP}}$ – electric power generation at the CCP, kWh;

**EC** $_{\text{aux CCP}}$ – electric power consumption for auxiliaries, kWh

$$SFC_{hBE} = \frac{\overline{FC_{hBE\ 2008-2010}}}{HO_{BE\ 2008-2010}}$$

**(formula D.1-4)**

$\overline{FC_{hBE\ 2008-2010}}$ - average fuel consumption for heat power delivered by the Novgorod HPS in 2008-2010, tfe;

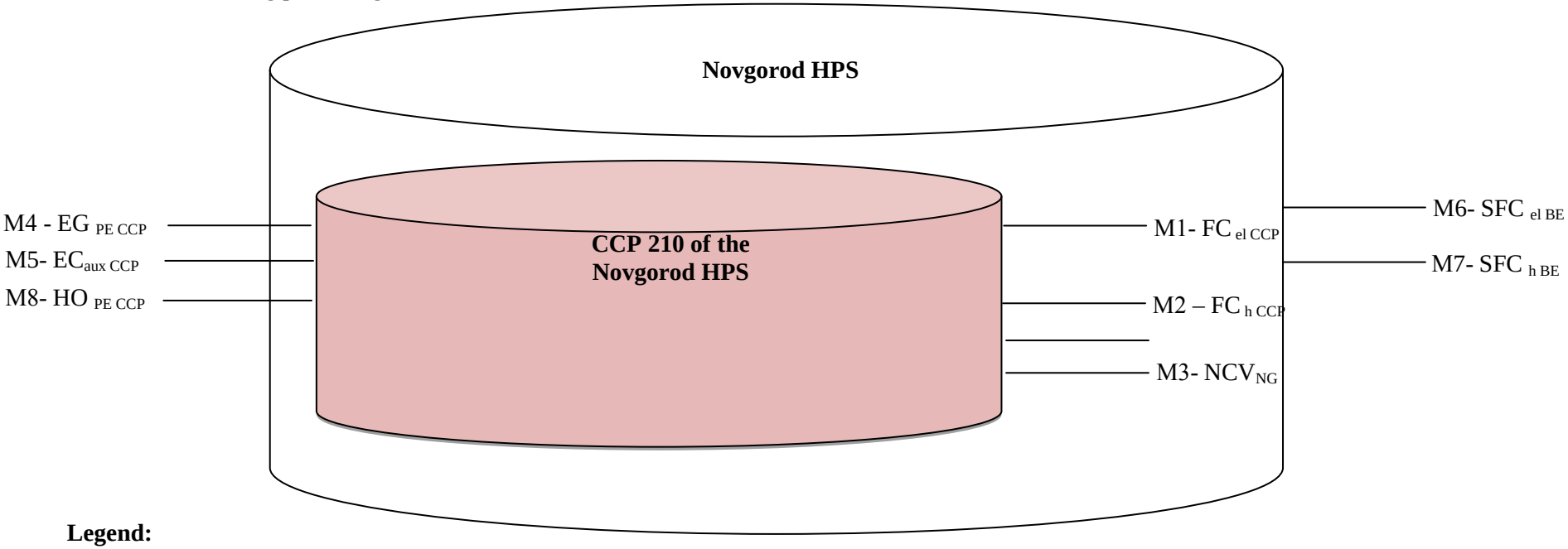
$HO_{BE\ 2008-2010}$ - average heat output from the Novgorod HPS in 2008-2010, Gkal;

The consumption of natural gas for the generation of electric power and heat power at the HPS is determined by calculating the total consumption of natural gas in accordance with ED 34.08.552-95 “Methodological regulations on the preparation of a report of an electric power plant and joint-stock company engaged in the power and electrification industry on the equipment cycle economy” and Instruction No.323 on the organizational management of the calculation and substantiation of the specific fuel consumption rates for electric and thermal power delivered by thermal stations and boiler plants in the RF Ministry of Energy. The consumption of natural gas at the CCP for electric power generation shall also be determined in accordance with the specified regulatory documents.

Parameters included in the Tables presented below are subject to monitoring. All the data collected for monitoring shall be kept for at least two years after the termination of the lending period (until 2015). All the measurements shall be carried out with accurate metering equipment in accordance with the standards of power industry.

The activity of the Novgorod HPS in the sphere of measurements and monitoring complies with the requirements of the Federal Law No. 4871-1 from April 27, 1993 “On ensuring the unity of measurements" and some other national regulations and standards of the regional metrological service. Existing plans, documents, and schedules of calibration tests of metering equipment are kept at the Novgorod HPS. Measurements of the basic project parameters are performed in accordance with the metrological system applicable in the country at the moment.

A scheme with monitoring points is given below:




**Legend:**

M1 – monitoring points

Option 1 has been selected out of the two options for the description of the monitoring plan.

**D.1.1. Option 1 – Monitoring of the emissions in the project scenario and the baseline scenario:**

| D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ID number *(Please use numbers to ease cross-referencing to D.2.)* | Data variable | Source of data | Data unit | Measured (m), calculated (c), estimated (e) | Recording frequency | Proportion of data to be monitored | How will the data be archived? (electronic/ paper) | Comment |
| M1 | **$FC_{el\ CCP}$** Amount of gas consumed by the CCP unit for the production of electric power | Fuel consumption log | $thsm^3$/month | (c) | Once a month | 100% | Paper/electronic | Calculated by specialists at the Novgorod HPS in accordance with ED 34.08.552-95 on the basis of the total consumption of natural gas at the CCCP which is measured with a measuring complex.[14] |
| M2 | **$FC_{hCCP}$** Amount of gas consumed by the CCP unit for the heat | Fuel consumption log | $thsm^3$/month | (c) | Once a month | 100% | Paper/electronic | Calculated by specialists at the Novgorod HPS in accordance with ED 34.08.552-95 |

[14] Information on the names of the metering devices for the CCP will be submitted later in accordance with the agreement with the OJSC "SZMA", No. 5000-2367-10 from 22.12.2010

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | production | | | | | | | on the basis of the total consumption of natural gas at the CCP which is measured with a measuring complex.[14] |
| M3 | **$NCV_{NG}$** Natural gas caloric value | Act of transfer and acceptance of gas | Kcal/$m^3$ | (e) | Once a month | 100% | Paper | Submitted once a month by the gas supply company OJSC "Novgorodoblgas" |

**D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of $CO_2$ equivalent):**

$$PE_y = PE_{fuel,y} = (FC_{elCCP,y} + FC_{hCCP}) * NCV_{NG} * EF_{CO2,NG} \quad \textbf{(formula D.1-5)}$$

where:

**$PE_y$** - total GHG project emissions, t CO2-eq
**$PE_{fuel,y}$** - GHG project emissions s from fuel consumption, t CO2-eq
**$FC_{elCCP}$** - fuel consumption for electricity production, mln m3/year
**$FC_{hCCP}$** - fuel consumption for heat production, mln m3/year
**$EF_{CO2,NG}$** - CO2 emission index for natural gas, equal to 56.1 tons of CO2 per TJ
**$NCV_{NG}$** - net calorific value of the natural gas, kcal per m3. To be converted in TJ by multiplying by 4,1868*10^-9TJ
**$EF_{CO2,NG}$** - CO2 emission factor for natural gas, equals to 56,1 t CO2 per TJ

| D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ID number *(Please use numbers to ease cross-referencing to D.2.)* | Data variable | Source of data | Data unit | Measured (m), calculated (c), estimated (e) | Recording frequency | Proportion of data to be monitored | How will the data be archived? (electronic/ paper) | Comment |
| M4 | **$EG_{PE\ CCP}$** Production of electric power at the CCP | Report from the Automated measuring and information system for electric power fiscal accounting | MWh/month | (m) | Regularly | 100% | Electronic | Measured by electricity meters.[16] |
| M5 | **$EC_{aux\ CCP}$** Electric power consumption for the CCP auxiliaries | Report from the Automated measuring and information system for electric power fiscal accounting | MWh/month | (m) | Regularly | 100% | Electronic | Measured by electricity meters.[15] |

[15] Information on the names of the metering devices for the CCP will be submitted later in accordance with the agreement with the OJSC "SZMA", No. 5000-2367-10 from 22.12.2010

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| M6 | **$SFC_{el\ BE}$** | The specific fuel consumption for the electricity output from the Novgorod HPS at the baseline. | gfe/kWh | (c) | Once | 100% | Paper | The calculation is done by calculating the average specific fuel consumption for the electricity output in 2008-2010. |
| M7 | **$SFC_{h\ BE}$** | The specific fuel consumption for the heat output from the Novgorod HPS at the baseline. | kgfe/Gkal | (c) | Once | 100% | Paper | The calculation is done by calculating the average specific fuel consumption for the heat output in 2008-2010. |
| M8 | **$HO_{PE\ CCP}$** Heat output from the CCP | Report from the Automatic control system of technological process | Gkal/month | (m) | Regularly | 100% | Electronic | Measured by measurement system.[16] |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| M3 | **$NCV_{NG}$** Natural gas caloric value | Act of transfer and acceptance of gas | Kcal/$m^3$ | (e) | Once a month | 100% | Paper | Submitted once a month by the gas supply company OJSC "Novgorodoblgas" |

**D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of $CO_2$ equivalent):**

$$\mathbf{BE_y = BE_{ad\ el} + BE_{sub\ el} + BE_{heat}} \qquad \textbf{(formula D.1-6)}$$

where:
**$BE_{ad\ el}$** – emissions from the production of electric power in the united power grid of the North West according to the baseline scenario, t $CO_2$;
**$BE_{sub\ el}$** – emissions from the production of electric power with the CCP unit replaced in accordance with the project, t $CO_2$;
**$BE_{heat}$** – emissions from the heat production at existing equipment of Novgorod HPS, t $CO_2$;

$$\mathbf{BE_{ad\ el} = (EO_{CCP} - EO_{BE}) * EF_{grid}} \qquad \textbf{(formula D.1-7)}$$

where:
**$EO_{CCP}$** – output of electric power from the CCP, kWh;
**$EF_{grid}$** – GHG emission rate during electric energy production in the united power grid of the North West, t $CO_2$/MWh;
**$EO_{BE}$** – output of electric power from the CCP that replaces the output of turbine PT-60 in the absence of the project, kWh (see formula D 1.1.);

$$\mathbf{EO_{CCP} = EG_{CCP} - EC_{CCP}} \qquad \textbf{(formula D.1-8)}$$

**$EG_{CCP}$** - generation of electric power at the CCP, kWh;
**$EC_{CCP}$** – consumption of electric power for the CCP auxiliaries, kWh

$$BE_{sub\ el} = EO_{BE} * SFC_{BE} * NCV_{NG} * EF_{CO2,\ NG} \quad \textbf{(formula D.1-9)}$$

where:

**$SFC_{BE}$** – specific fuel consumption for the generation of electric power from the Novgorod HPS according to the baseline, tfe/kWh (see formula D 1.2);

**$NCV_{NG}$** - net calorific value of the natural gas, kcal per m3. To be converted in TJ by multiplying by 4,1868*10^-9TJ

**$EF_{CO2,\ NG}$** - CO2 emission factor for natural gas, equals to 56,1 t CO2 per TJ

$$BE_{heat} = HO_{CCP} * SFC_{hBE} * COEF_{NG}$$

Where:

**$HO_{CCP}$** – heat output from CCP unit under the project, Gkal

**$SFC_{hBE}$** – specific fuel consumption for heat output from the Novgorod HPS according to the baseline, gfe/Gkal;

**D. 1.2. Option 2 – Direct monitoring of emission reductions from the project (values should be consistent with those in section E.):**

Not applied.

**D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:**

| ID number *(Please use numbers to ease cross-referencing to D.2.)* | Data variable | Source of data | Data unit | Measured (m), calculated (c), estimated (e) | Recording frequency | Proportion of data to be monitored | How will the data be archived? (electronic/ paper) | Comment |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |

**D.1.2.2. Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of $CO_2$ equivalent):**

Not used

**D.1.3. Treatment of leakage in the monitoring plan:**

Project leakages are equal to 0.

| D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ID number *(Please use numbers to ease cross-referencing to D.2.)* | Data variable | Source of data | Data unit | Measured (m), calculated (c), estimated (e) | Recording frequency | Proportion of data to be monitored | How will the data be archived? (electronic/ paper) | Comment |
| | | | | | | | | |
| | | | | | | | | |

**D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of $CO_2$ equivalent):**

Leakages in this project are taken as CH4 emissions related to the extraction, processing, transportation and distribution of natural gas and other types of fuel. The fuel consumption for the baseline is higher than that of the project, and therefore leakages at the baseline are higher than leakages at the project. Thus, following conservative principles, leakages are taken to be equal to zero.

**D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of $CO_2$ equivalent):**

$$ER_y = BE_y - PE_y - LE \qquad \text{(formula D.1-10)}$$

**D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project:**

According to the resolution of Rosstat 157 from 30.04.2004 "On the approval of statistic toolkits for organizing the statistic monitoring of production and consumption wastes by Rostekhnadzor," and the order of Rosstat No. 166 from 10.08.2009 "On the approval of statistic toolkits for organizing the federal statistic monitoring of agriculture and environment," every year the Novgorod HPS submits the following reports to the Directorate of Federal Service for Environmental Control in the Novgorod region (Rosprirodnadzor):
2-tp (air) – Information on atmospheric protection
2-tp (wastes) – Information on the formation, neutralization, transportation and disposal of industrial and consumer waste, in natural units

2-tp (water management) – Information on water management, in natural units

A specialized company is engaged to develop the “Project on the emission standards of hazardous (contaminating) substances to the atmosphere and hazardous physical effects”. Once every 5 years the company performs an "Inventory of the stationery sources that emit contaminating substances" at the Novgorod HPS. The inventory results are approved by Rosprirodnadzor and the “Project on the emission standards of hazardous (contaminating) substances to the atmosphere and hazardous physical effects” is developed. This Project is submitted to Rosprirodnadzor. On the basis of the conclusion approved by Rosprirodnadzor a "Permit to emit pollutants into the atmosphere" is issued which remains valid for five years.

Once a year standards for the maximum allowable emissions of pollutants are controlled, a report on the emission of pollutants into the atmosphere is prepared and submitted to Rosprirodnadzor. Once a month an environmental engineer calculates the emissions of pollutants into the atmosphere. To substantiate the calculations, the emissions of pollutants from stationary sources into the atmosphere are measured every quarter, and the results are entered into the Log of Changes.

The implementation of control procedures and the quality of the aforementioned parameters is ensured by complying with the requirements of the following documents:

| **D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:** | | |
|---|---|---|
| Data *(Indicate table and ID number)* | Uncertainty level of data (high/medium/low) | Explain QA/QC procedures planned for these data, or why such procedures are not necessary. |

| | | |
|---|---|---|
| M-1, M-2<br>(Table D1.1.1) | Low | The consumption of natural gas for electric power generation at the Novgorod HPS is determined by means of a calculation on the basis of the total consumption of natural gas in accordance with ED 34.08.552-95 “Methodological instructions on the preparation of a report by a power plant and joint-stock company engaged in the power and electrification industry on the equipment cycle economy" and Instruction No. 323 on the organization of work to calculate and substantiate the standards of specific fuel consumption for electric and thermal power served by the electric power plants and boiler plants in the Ministry of Energy. Natural gas consumed at the CCP for the generation of electric power will also be determined in accordance with the specified regulatory documents. The total gas consumption is measured by metering the complex TELEPERM-ME which undergoes annual certification. |
| M-3<br>(Table D1.1.1 and D.1.1.3) | Low | This parameter is submitted together with the transfer and acceptance Act for gas; it is evaluated by an attested calorimetric laboratory at the Novgorod HPS. |
| M-4, M-5<br>(Table D1.1.3) | Low | Will be measured by electricity meters that will be included in the existing Automated measuring and information system for electric power fiscal accountingof the OOJSC “Novgorod HPS”. The system is certified and should undergo calibration once every 5 years. Information on the names of the metering devices for the CCP and the recalibration interval will be submitted later in accordance with the agreement with OOJSC “SZMA” №5000-2367-10 from 22.12.10 |
| M-6, M-7<br>(Table D1.1.3) | Low | The calculation is done by calculating the average specific fuel consumption for the heat output in 2008-2010. |
| M-8<br>(Table D1.1.3) | Low | Will be measured by measurement system that will be included in Automatic control system of technological process of CCP. Information on the names of the metering devices for the CCP and the recalibration interval will be submitted later in accordance with the agreement with OOJSC “SZMA” №5000-2367-10 from 22.12.10 |

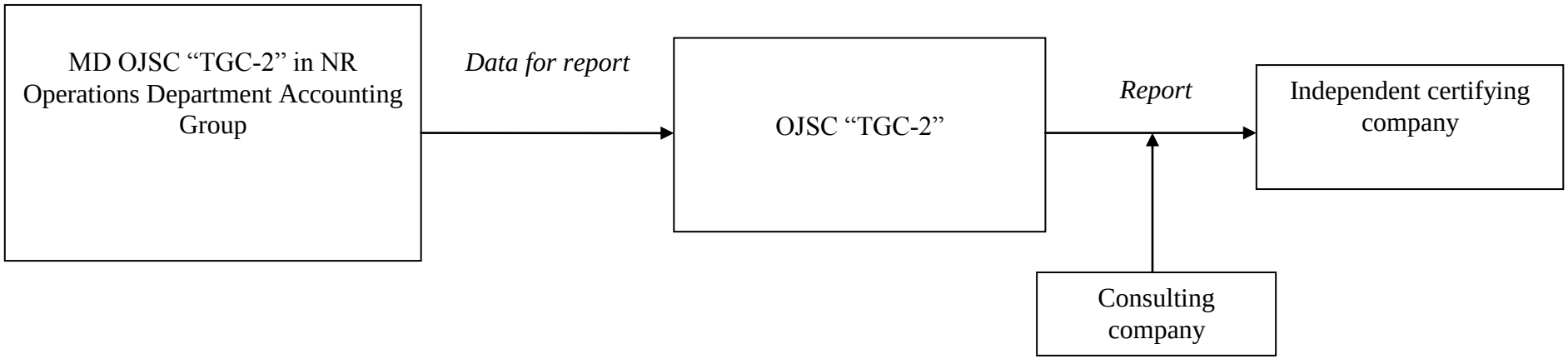
- The Federal Law from 26.6.2008 N 102-FZ “On ensuring the uniformity of measurements";
- “The Requirements in respect to the performance of calibration works," approved by Resolution No.17 of Gosstandart of Russia from 21.09.1994;
- The IS state register;
- PR 50.2.006-94.

**D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan:**

The operational structure of the Project is the existing scheme of data collection, transfer and storage; it should be kept for two years after the last transfer of ERUs on the project.

The preparation of reports on fuel consumption, and the generation of electric power is the responsibility of the operations group at the MD OOJSC "TGC-2" in the Novgorod region. This information will be transferred to the Executive Office.

The scheme presented in the picture D.3. will be applied during the implementation of the monitoring plan for the preparation of verification reports.




*Pic. D.3. The operational and administrative scheme of the Project*

In order to implement the project activity and implement the operational activity of the project 69 additional staff members are required, and additional training sessions need be conducted. There are provisions for this in the agreement with the general contractor.

**D.4. Name of person(s)/entity(ies) establishing the monitoring plan:**

Monitoring plan developed by:

Closed Joint-Stock Company "National Carbon Sequestration Foundation" (Moscow);

Contact: Evgenia Baydakova, Senior Expert of the Project Development Department;
Phone: 8 499 788 78 35 ext. 104
Fax: 8 499 788 78 35 ext. 107
e-mail: BaydakovaEV@ncsf.ru

Closed Joint-Stock Company "National Carbon Sequestration Foundation" is not a project participant.

## SECTION E. Estimation of greenhouse gas emission reductions

### E.1. Estimated project emissions:

Table E.1.1

| Line No. | Indicator/month | 2011 | 2012 | 2011-2012 |
|---|---|---|---|---|
| 1 | $FC_{el\ CCP}$ (ths $m^3$) | 142,373 | 285,147 | 427,520 |
| 2 | $FC_{h\ CCP}$ (ths $m^3$) | 12,344 | 28,482 | 40,826 |
| 3 | $COEF_{NG}$ (t $CO_2$/ths $m^3$) | 1,879 | | |
| 4 | $PE_y$ ($tCO_2$) | 290,718 | 589,321 | 880,039 |

$PE_y$ = ([1]+[2]) * [3]
A detailed calculation is shown in the Excel calculation tables.

### E.2. Estimated leakage:

Table E.2.2

| | 2011 | 2012 | 2011-2012 |
|---|---|---|---|
| t $CO_2$ | 0 | 0 | 0 |

### E.3. The sum of E.1. and E.2.:

Table E.3.1

| | 2011 | 2012 | 2011-2012 |
|---|---|---|---|
| t $CO_2$ | 290,718 | 589,321 | 880,039 |

### E.4. Estimated baseline emissions:

Emissions for the baseline are determined in accordance with the formulae presented in Section D 1.1.4.

Table E.4.1

| Line No. | Indicator/year | 2011 | 2012 | 2011-2012 |
|---|---|---|---|---|
| 1 | $EG_{CCP}$ (MWh) | 611,928 | 1,235,208 | 1,847,136 |
| 2 | $EC_{aux\ CCP}$ (MWh) | 39,738 | 81,226 | 120,964 |
| 3 | $EO_{BE}$ (MWh) | 51,890 | 132,254 | 184,144 |
| 4 | $SFC_{elBE}$ (tfe/MWh) | 0.391 | | |
| 5 | $COEF_{NG}$ (t $CO_2$/tfe) | 1,644 | | |
| 6 | $EF_{grid}$ | 0.548 | | |
| 7 | $HO_{CCP}$ (Gkal) | 104,652 | 241,476 | 346,128 |
| 8 | $SFC_{hBE}$ (tfe/MWh) | 153.9 | | |
| 9 | BE (t $CO_2$) | 346,099 | 705,035 | 1,051,134 |

**$BE_y$ = ([3]*[4]*[5]) + ([1]-[2])*[6]+ ([7]*[8]*[5])**

A detailed calculation is shown in the Excel calculation tables.

## E.5. Difference between E.4. and E.3. representing the emission reductions of the project:

The reduction of emissions is determined as the difference between the values of line [13] of Table E.4-1 and line [11] of Table E.3-1.

Table E.5.1

| | 2011 | 2012 | 2011-2012 |
|---|---|---|---|
| t $CO_2$ | 55,382 | 115,713 | 171,095 |

## E.6. Table providing values obtained when applying formulae above:

Table E.6.1

| Year | Estimated project emissions (tonnes of CO2 equivalent) | Estimated leakage (tonnes of CO2 equivalent) | Estimated baseline emissions (tonnes of CO2 equivalent) | Estimated emission reductions (tonnes of CO2 equivalent) |
|---|---|---|---|---|
| 2008 | 0 | 0 | 0 | 0 |
| 2009 | 0 | 0 | 0 | 0 |
| 2010 | 0 | 0 | 0 | 0 |
| 2011 | 290,718 | 0 | 346,099 | 55,382 |
| 2012 | 589,321 | 0 | 705,035 | 115,713 |
| Total (tons of $CO_2$ equivalent) | 880,039 | 0 | 1,051,134 | 171,095 |

The Excel calculation tables are applied as a separate file, Annex 5.

## SECTION F. Environmental impacts

### F.1. Documentation on the analysis of the environmental impacts of the project, including transboundary impacts, in accordance with procedures as determined by the host Party:

Materials containing the environmental impact assessment (EIA) are obligatory for the project documentation; they sum up the results of the assessment of the impact on the natural, social, (including the daily life activities of the populace) and industrial environment and substantiate the admissibility of the proposed activity.

An analysis of the impact of the project "Expansion of the Novgorod HPS with a gas turbine unit GTE-160 with a steam waste-heat boiler" on the environment has been carried out as part of the preparation of the project documentation.

The analysis of recognized impacts on the environment contained in EIA has shown that, as a result of the design decisions the CCP unit will be an impact source on the atmosphere. The total emissions of pollutants from the plant will increase by 566.8 tons per year.

Calculations of dispersion have shown that during the operation of the CCP unit the total ground level concentrations of pollutants released by the enterprise, taking into account the existing sources will meet the requirements of sanitary norms.

The implementation of the design solution on expanding the Novgorod HPS with a CCP unit will not lead to the reconstruction of existing water and wastewater systems, and will not increase the discharge of surface runoff.

Increasing the amount of waste to 16.07 tons / year at the Novgorod HPS after expansion will not mean that additional temporary storage space is required within the territory of the enterprise. All waste from operation and construction will be sent for disposal, recycling, reprocessing or neutralization to licensed organizations in accordance with the scheme existing at the NHPS.

By complying with the fundamental design decisions and environmental regulations during the construction and operation of the power unit, and by taking timely preventive measures for the equipment and all the power networks, it will be possible to reduce to a minimum the allowable possible negative impact of the facility on the surface water, groundwater and the environment in general.

In general, on the basis of the analysis of the impact of the designed facility on the environment it is possible to conclude that the expansion of the Novgorod HPS and further operation of the CCP will not produce a significant hazardous impact on the environment and will not cause irreversible changes to the environment.

### F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to supporting documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

According to the results of the SEE (State Environmental Evaluation), the FSU "Glavgosekspertiza of Russia" has issued a favorable conclusion No. 280-09/GGE-6044/02 from 08.05.2009 (No. in register 00-1-4-1843-09). Also, the Federal Service for Environmental, Technological and Nuclear Supervision issued a permit for the emission of pollutants No. 40-03-128-B-10/12 from 21.10.2009 that will remain valid until 31.12.2012

## SECTION G. Stakeholders' comments

### G.1. Information on stakeholders' comments on the project, as appropriate:

On March 28, 2008 hearings were held on the project "Expansion of the main building and P 50 turbine reconstruction on the territory of the NTP." Representatives of the Administration of Veliky Novgorod, mass media and society, including inhabitants of Veliky Novgorod were present at the hearings.

The positive result of the public hearings was published in the newspaper "Novgorod".

Annex 1

## CONTACT INFORMATION ON PROJECT PARTICIPANTS

| | |
|---|---|
| Organisation: | OJSC «TGC -2» |
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Annex 2

## BASELINE INFORMATION

**1. The table below presents the key parameters and variables used to determine the baseline:**

| Data/Parameter 1 | **$EO_{BE}$** |
|---|---|
| Data unit | MWh/year |
| Description | Electricity output from the PT-60 turbine of the Novgorod HPS at the baseline. |
| Time of determination /monitoring | Determined once. |
| Source of data (to be) used | Calculated by the Novgorod HPS experts based on annual data from the 2008-2010 annual reports.<br>The calculation is presented in the Excel file - Annex 5. |
| Value of data applied<br>(for ex ante calculations/determinations) | 132,254 MWh/year |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The calculation is done by calculating the average electricity supply from the PT-60 turbine of the Novgorod HPS in 2008-2010. |
| QA/QC procedures (to be) applied | All calculations are based on the measured data presented in the annual reports. All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |
| Any comment | |

| Data/Parameter 2 | **$SFC_{BE}$** |
|---|---|
| Data unit | gfe/kWh |
| Description | The specific fuel consumption for the electricity output from the Novgorod HPS at the baseline. |
| Time of determination /monitoring | Determined once. |
| Source of data (to be) used | Calculated by the Novgorod HPS experts based on annual data from the 2008-2010 annual reports.<br>The calculation is presented in the Excel file - Annex 5. |
| Value of data applied<br>(for ex ante calculations/determinations) | 391 gfe/ kWh |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The calculation is done by calculating the average specific fuel consumption for the electricity output in 2008-2010. |
| QA/QC procedures (to be) applied | All calculations are based on the measured data presented in the annual reports. All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |

| | |
|---|---|
| Any comment | |

| | |
|---|---|
| Data/Parameter 3 | **$EO_{ad\ el}$** |
| Data unit | MWh/year |
| Description | The amount of electric power output from the CCP-210 substituting the electric power supply from the power plants of united power grid of the North West (the additional power output from the Novgorod HPS as a result of the project implementation). |
| Time of determination /monitoring | Annually |
| Source of data (to be) used | Calculated by the Novgorod HPS experts based on data on the electricity output from the PT-60 turbine at the baseline, and output from the CCP-210 according to the project. |
| Value of data applied (for ex ante calculations/determinations) | 2011 – 520,300 MWh<br>2012 – 1,021,728 MWh |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | All data is measured with electricity meters, the measurement results are transferred to the central server of the Automated measuring and information system for electric power fiscal accounting |
| QA/QC procedures (to be) applied | The Automated measuring and information system for electric power fiscal accountingis certified and is checked every 5 years.<br>All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 4 | **$HO_{CCP}$** |
| Data unit | Gkal/year |
| Description | Heat output from CCP unit under the project |
| Time of determination /monitoring | Every year |
| Source of data (to be) used | Report from the Automatic control system of technological process |
| Value of data applied (for ex ante calculations/determinations) | 2011– 104 652 Gkal<br>2012 – 241 476 Gkal |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Measured by measurement system[16] |

[16] Information on the names of the metering devices for the CCP will be submitted later in accordance with the agreement with the OJSC "SZMA", No. 5000-2367-10 from 22.12.2010

| | |
|---|---|
| QA/QC procedures (to be) applied | All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 5 | **$SFC_{h\,BE}$** |
| Data unit | gfe/Gkal |
| Description | The specific fuel consumption for the heat output under the Novgorod HPS at the baseline. |
| Time of determination /monitoring | Determined once. |
| Source of data (to be) used | Calculated by the Novgorod HPS experts based on annual data from the 2008-2010 annual reports. The calculation is presented in the Excel file - Appendix 5. |
| Value of data applied (for ex ante calculations/determinations) | 153.9 g.f.e/Gkal |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The calculation is done by calculating the average specific fuel consumption for the heat output at the Vologda HPS in 2008-2010. |
| QA/QC procedures (to be) applied | All calculations are based on the measured data presented in the annual reports. All measurements are made by the calibrated measuring devices in accordance with the standards in the energy industry. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 4 | **$NCV_{NG}$** |
| Data unit | $Kcal/m^3$ |
| Description | Natural gas caloric value. |
| Time of determination /monitoring | Monthly |
| Source of data (to be) used | Transfer and acceptance act. |
| Value of data applied (for ex ante calculations/determinations) | 8000 Kcal |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | Submitted once a month by the gas supplying company "Novgorodoblgaz". |
| QA/QC procedures (to be) applied | This parameter is provided with the certificate for purchased fuel, and evaluated by an independent certified laboratory. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 5 | **$EF_{grid,\,CM}$** |
| Data unit | $tCO_2/MWh$ |
| Description | Joint emission factor from the united power grid of the North |

| | |
|---|---|
| | West |
| Time of determination /monitoring | Calculated once |
| Source of data | The project design documents: "Enhancement of Yuzhnaia CHP – 22 of St-Petersburg. Construction of unit #4, JSC "TGC-1", Leningrad region, Russia", http://ji.unfccc.int/UserManagement/FileStorage/436NUFJHCEVGMBT9A7DLQROWZPY1I8 Reference number on UNFCCC site – 0197. |
| Value of data applied (for ex ante calculations/determinations) | 0.548 |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | The factor is estimated by Energy Carbon Fund in compliance with the approved CDM procedure "Guidelines for emission factor estimation for the power grid" (version 02) |
| QA/QC procedures (to be) applied | The project design documents: "Enhancement of Yuzhnaia CHP – 22 of St-Petersburg. Construction of unit #4, JSC "TGC-1", Leningrad region, Russia" was determined by an independent expert company: Bureau Veritas Certification Holding SAS. |
| Any comment | |

| | |
|---|---|
| Data/Parameter 6 | $\mathbf{EF_{CO2,NG}}$ |
| Data unit | t $CO_2$/TJ |
| Description | $CO_2$ emission factor for natural gas combustion |
| Time of determination /monitoring | Determined once |
| Source of data | |
| Value of data applied (for ex ante calculations/determinations) | 56.1 t /TJ |
| Justification of the choice of data or description of measurement methods and procedures (to be) applied | This parameter is provided in 2006 IPCC Guidelness for National Greenhouse Gas Inventories, Table 1.4. |
| QA/QC procedures (to be) Applied | - |
| Any comment | - |

Annex 3

**MONITORING PLAN**

**The information is provided at section D of the PDD.**

Annex 4

**Details of calculation of financial/economic indicators and sensitivity analysis (attached in a separate excel file)**

Лист Microsoft Excel 97-2003

Annex 5

## Excel tables with initial data and calculations (attached in a separate excel file)

Лист Microsoft Excel
97-2003