“Rehabilitation of the District Heating System in Donetsk Region”

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SECTION A. General description of the project

A.1. Title of the project:

“Rehabilitation of the District Heating System in Donetsk Region”
PDD Version: 03, dated November 09, 2006

A.2. Description of the project:

The project main goal is fuel consumption reduction, in particular reduction of natural gas (which is imported to Ukraine), coal and oil consumption, by means of district heating system rehabilitation in Donetsk Region, including boiler and distribution network equipment replacement and rehabilitation, and installation of combined heat and power production plants. Such reduction of fuel consumption will result in decrease of greenhouse gas emissions (CO$_2$ and N$_2$O). The purpose of the project is sustainable development of the region through implementation of energy saving technologies.

Donetsk region’s district heating (DH) utility (system of heat supply enterprises) supplies and sells heat energy in forms of heat, hot water and steam, to local consumers, namely households, municipal consumers and state-owned organizations. It is a natural monopolist of heat production in the region. Heat supply market in the region is stable for years.

The project was initiated in 2004 to rehabilitate Donetsk region’s district heating system, including boiler and distribution network equipment replacement and rehabilitation, and installation of combined heat and power production plants (CHP). The project “Rehabilitation of the District Heating System in Donetsk Region” consists of two parts: Rehabilitation of Donetsk Region and Rehabilitation of Donetsk City. 283 boiler-houses with 1268 boilers and 1026 km of heat distributing networks are involved in the rehabilitation of Donetsk Region and 30 boiler-houses with 159 boilers and 230 km of heat distributing networks are involved in the rehabilitation of Donetsk City. In total: 313 boiler-houses with 1427 boilers and 1256 km of heat distributing networks are involved in the project. This is the large part of Donetsk regional DH system, and project may be expanded by including the other DH objects in the region.

Installation of cogeneration units at 10 boiler houses (12 gas engines, 0.5-0.63 MW each) in Donetsk region with total installed capacity 7.3 MW and at 6 boiler houses in Donetsk city (6 gas engines, 0.38 - 0.5 MW each) with total installed capacity 2.88 MW, in sum 18 gas engines with total installed capacity 10.18 MW, is incorporated into the project. JSC "Pervomaiskidieselmarsh", Deutz (Germany) and Jenbacher (Austria) machines are considered as potential candidates for installation.

The project employs the increase in fuel consumption efficiency to reduce greenhouse gas emissions relative to current practice. Over 11 million Nm$^3$ of natural gas and 47 thousand ton of coal will be saved annually starting from 2009. Such reduction of fuel consumption is based on increase of the boiler efficiencies, reduction of heat losses in networks and CHP installation. The following activities will ensure fuel saving:

- Replacement of old boilers by new highly efficient boilers;
- Upgrading of boilers’ burners;
- Switching boiler houses from coal and fuel oil to natural gas;
- Improving of the network organization, application of the new insulation and the pre-insulated pipes;
- Installation of combined heat and power plants.

Estimated project annual reductions of GHG emissions, in particular CO$_2$, are by 163 thousand tons per year starting from 2009 comparing to business-as-usual or baseline scenario.

Implementation of the project will provide substantial economic, environmental, and social benefits to the Donetsk region. Social impact of the project is positive since after project implementation heat supply service will be improved and tariffs for heat energy will not be raised to cover construction costs.
Environmental impact of the project is expected to be very positive as an emission of the exhaust gases such as CO\(_2\), NO\(_x\), and CO will be reduced. Also due to better after-implementation service, some part of population will cease to use electric heaters thus reducing electricity consumption, which is related to power plants emissions of CO\(_2\), SO\(_x\), NO\(_x\), CO and particulate matter.

Estimated project risks are limited and minimized. Ukraine has claimed district heating and municipal energy sector as a priority of the national energy-saving development.

### A.3. Project participants:

<table>
<thead>
<tr>
<th>Party involved</th>
<th>Legal entity project participant (as applicable)</th>
<th>Please indicate if the Party involved wishes to be considered as project participant (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ukraine (Host Party)</td>
<td>RME “Donetskteplocomunenergo”; Institute of Engineering Ecology, Ltd</td>
<td>No</td>
</tr>
</tbody>
</table>

The project is initiated by two partners that distribute their functions in the project as follows:

- **RME “Donetskteplocomunenergo”:** is a project implementation agency (Supplier), which represents heat supply enterprises of Donetsk region. It operates equipment for heat production and distribution, and renders the heat supply services. As far as this organization purchases all the necessary inputs, including fuel, electricity, water, etc., it has the primary interest in the reduction of specific fuel consumption that can be achieved by the implementation of the project. Besides, this enterprise has all licenses and permissions, required under Ukrainian legislation, to perform designing and rehabilitating of the equipment. It is responsible for designing, engineering and installation works execution by its own personnel or with the aid of subcontractors. It finances this project (partly on credit base) and receives profits.

**Historical details:**

The Regional production association “Donetskteploset” was organized in April, 1978, on the base of 13 enterprises in Donetsk Region. Since this time the enterprise had undergone some structural changes – the amount of productive units and the name was changed (nowadays the Regional (oblast) municipal enterprise “Donetskteplocomunenergo” includes 24 industrial units) as well as the amount of workers.

Today the Regional Municipal Enterprise (RME) “Donetskteplokomunenergo” is a powerful complex, which is a huge heat supply enterprise in Ukraine. It supplies heat to over 270 thousands of personal accounts in Donetsk Region. The stuff of the enterprise consists of about 6 ths workers. They provide continuous operation of the heat generating, transporting and distributing equipment.

**Enterprise characteristics:**

<table>
<thead>
<tr>
<th></th>
<th>01.01.2004</th>
<th>01.01.2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total amount of the boiler-houses</td>
<td>318</td>
<td>372</td>
</tr>
<tr>
<td>Length of the heat supply networks in the 2-pipe calculation, km</td>
<td>1187.4</td>
<td>1288.1</td>
</tr>
<tr>
<td>Total enterprise capacity, Gkal per hour</td>
<td>2736.6</td>
<td>2995.0</td>
</tr>
<tr>
<td>Connected heat load, Gkal per hour</td>
<td>1680.0</td>
<td>1686.7</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Heating area (living), 1000*m²</td>
<td>11701.1</td>
<td>11875.7</td>
</tr>
<tr>
<td>Amount of personal accounts</td>
<td>260785</td>
<td>273049</td>
</tr>
</tbody>
</table>

The heating area for the population makes 81.1 %, for the legal entities – 18.9 %.

Today 24 productive units are the members of Regional municipal enterprise “Donetskstulepomunenergo”. They supply the Donetsk Region residents with heat and hot-water.

- **Institute of Engineering Ecology, Ltd:** is a research and engineering organization. It is responsible for development of project feasibility study, development of the Joint Implementation project, development and choice of appropriate technologies, and further selection of necessary equipment. It will also take part in environmental monitoring and verification processes.

**Historical details:**

Institute of Engineering Ecology (IEE), Ltd., is the independent nongovernmental professional organization, created in February, 1992. It deals mainly with the engineering ecological problems in industrial sphere. Its activity is aimed at development, production and application of the new ecologically pure technologies and various equipment for fuel and energy saving and environmental protection, as well as at carrying out ecological and energetic investigations and examinations.

Institute’s activity is being executed by well-qualified and experienced specialists, including possessing DrSci and PhD degrees, in fields of heat power engineering, industrial and municipal heat supply, district heating, gas cleaning, toxic substances formation and decomposition in burning processes, waste utilization, etc.

IEE has accomplished a number of projects on development and application of the technologies for energy saving in the processes of heat generation and reduction of toxic and greenhouse gas emission. Such projects are applied, in particular, in the municipal district heating systems of the cities of Kiev, Zhytomir, Vinnitsa, Sumy, Lugansk, Yalta, Khmelnitsky, Odessa, Sevastopol, Simferopol, etc., as well as at industrial enterprises in Kharkov, Lvov, Kiev, Donetsk and Khmelnitsky regions, and also in Moscow and Moscow region.

IEE deals with questions related to the global climate change, greenhouse gas mitigation and Kyoto protocol, since 1998.

IEE is the main scientific and engineering organization of the Ministry of Construction, Architecture, Housing and Municipal Economy of Ukraine (under the management of which there are all district heating enterprises of the country, that consume over 30% of total fuel consumption by the country) in field of control and reduction of CO₂ emission, and by the task of this Ministry (previously the State Committee) has executed expert estimation of potential and possibilities of reduction of CO₂ emission into atmosphere from the municipal district heating utilities of Ukraine. To date, IEE has prepared the Project Idea Notes (PIN) for the JI projects on the rehabilitation of the district heating systems for several cities (Vinnitsa, Khmelnytsky, Lugansk, Chernihiv, Donetsk, Rivne, etc) and regions (Chernihiv and Donetsk regions, Autonomous Republic of Crimea) of Ukraine, under preparation there are the PINs for cities Dnipropetrovsk, Zhytomir, Kherson, Odesa and several industrial enterprises. The complete Project Design Documents (PDD) were prepared for Chernihiv region (the first in Ukraine JI project) and AR Crimea, these projects already successfully passed the validation.

Questions of energy saving and reduction of greenhouse gas emission traditionally take the considerable part of reports at International conferences «Problems of ecology and exploitation of energy objects», annually held by IEE in Sevastopol (The Crimea).
IEE is the co-organizer of the First (October 3-5, 2005, Kyiv, Ukraine) and the Second (to be held on October 23-25, 2006, Kyiv, Ukraine) International Conferences on JI Projects in Ukraine “Climate Change and Business”.

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

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

The Project is located in Donetsk Region in the South-Eastern part of Ukraine (Fig.1).

![Fig. 1. The map of Ukraine with neighboring countries](image-url)

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A.4.1.1. Host Party(ies):

Ukraine.

Ukraine is an Eastern European country that ratified the Kyoto Protocol to UN FCCC on February 4th, 2004, and is eligible for the Joint Implementation projects.

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

Donetsk Region.

Donetsk region is located in the South-Eastern part of Ukraine. Its territory is 26500 km² (about 4.4% of the total area of Ukraine), its longitude from north to south is 270 km, from east to west – 190 km. Its population (as of 2004) is about 4.7 million constitutes 10% of the overall Ukrainian population, making it the most populous and most densely populated region of the country. Its large population is due to the presence of several big industrial cities and numerous villages agglomerated around them. About 4.3 ml people live in cities (90%), about 0.4 ml people (9,1%) – in villages.

The Donetsk region's climate is mostly continental, which is characterized by hot summers and relatively cold winters with changeable snow surfaces. The average temperatures are: -7 °C in January, and +19 °C in July, with average annual rainfall of 524 mm [SNiP]. Thus the heating period is 183 days. The average outside temperature over the heating period is -1.8 °C.

On January 1st, 2004, Donetsk region accounted for 23.7 ml m² residential buildings, 514 boiler houses and about 2000 km of heat and steam networks that belong to the communal property. Besides the RME “Donetskteplocomunenergo”, there are also other district heating enterprises in Donetsk region, but the networks are separated, not conjuncted, and no conjunction of the networks is planned.

Donetsk region borders in the south-west and west – upon Zaporizhya and Dnipropetrovsk regions, in the north-west upon Kharkiv region, in the north-east – upon Luhans region, in the east – upon Rostov region of Russian Federation. On the south Donetsk region is washed by Azov Sea. There are 28 cities of regional submission in Donetsk region: Donetsk, Avdiyivka, Artemivsk, Gorlivka, Debaltseve, Dzerzhynsk, Dmytrov, Dobropillya, Dokuchayevsk, Enakieve, Zhdanivka, Kirovske, Kostiantynivka, Kramatorsk, Krasnoarmiysk, Krasniy Lyman, Makiyivka, Mariupol, Novogrodovka, Selidove, Slov’yansk, Snizhne, Torez, Vugledar, Chertyszsk, Shahtarsk, Yasinuvata. The territory is divided into 18 districts: Amvrosijivsky, Artemivsky, Velykonovoselkivsky, Volnovakhsky, Volodarsky, Dobropilsky, Konstyantynivsky, Krasnoarmijsky, Krasnolymansky, Mar’jinsky, Novoazovsky, Oleksandrivsky, Pershotravnevy, Slov’yansky, Starobeshhevsky, Telmanivsky, Shakhtarsky, Yasynuvatsky.

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

Cities, towns and villages of the Donetsk Region (see the next issue).

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

It should be noted that the district heating systems from the majority of territorial districts of the Donetsk Region are involved in the project in question. The majority of places involved in the project (inscribed on the map) are marked with blue circles (Fig. 2).
By the organizing structure, 24 district heating productive units are the members of regional municipal enterprise “Donetskteplokomunenergo” (Project Supplier), and belong to it. They are situated in the following cities:

1. Amvrosiyivka
2. Volnovaha
3. Debaltseve
4. Dzerzhynsk
5. Dmytryevo
6. Druzhkivka
7. Enakiyeve
8. Zhdanivka
9. Kirovske
10. Konstantinivka
11. Kramatorsk
12. Krasniy Lyman
13. Novoazovsk
14. Selidove
15. Slovyansk
16. Snizhne
17. Starobesheve
18. Telmanove
19. Torez
20. Ugledar
21. Hartsyzsk
22. Chasov Yar
23. Shahtarsk

Besides, the RME “Donetskteplokommunenergo” is empowered to represent the owners (managers) of boiler-houses in Artemivsk and Donetsk city, for all activity associated with this JI project.
Fig. 2. Location of Donetsk region’s major cities and towns where project will be implemented.
A.4.2. Technology(ies) to be employed, or measures, operations or actions to be implemented by the project:

Measures that will be used to improve the efficiency of Donetsk Region DH utility are as follows:

- Old operating but low efficient boilers will be replaced by the new highly efficient ones that will result in efficiency increase from 40-85% up to 90-92%.
- Old operating low efficient coal-fired and fuel oil-fired boilers will be partially switched to or replaced by the new gas-fired boilers.
- Upgrading of boilers’ burners will increase the efficiency by 3-5% due to improved combustion with excess air coefficient decreasing and reducing CO and NO\textsubscript{x} emissions.
- The efficiency of the heat distribution networks system will be considerably increased by:
  - decreasing pipelines length (moving heat generating source closer to consumer);
  - improving of network organization (replacing 4-pipe lines by 2-pipe ones with simultaneous installation of heat exchangers directly at the consumers);
  - replacing of the main network pipes with diameter 57 mm and more by the pre-insulated ones and renovation pipe insulation with using of foamed polyurethane.

These measures will substantially reduce heat losses from existing 20-35% and even more, down to 1-2 % per km.

- Installation of cogeneration units will result in increasing the fuel consumption efficiency, decreasing of dependence on the power supply and improvement of operational stability and reliability, decreasing of power consumption from power stations, decreasing of power transfer losses, and decreasing of environmental pollution.

Achieved results of employing of these technologies and measures are listed in the Appendixes 1 - 6. These technologies are already approved but some of them are not widespread. Therefore, there might be some bottlenecks, which are typical when implementing new technologies and equipment.

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 project activities including rehabilitation of boilers, heat distribution networks and installation of combined heat and power coupling plants will increase energy efficiency of Donetsk Region DH system thus enabling it to produce the same amount of heat energy with less fuel consumed. Additionally it will produce electric power with less specific fuel consumption. Reduced fuel consumption will make lower CO\textsubscript{2} emissions.

In the absence of the proposed project, all equipment, including the old low efficient but still workable for a long life period, will operate in as-usual mode, and any emission reductions would not occur.

Ukraine has claimed district heating and municipal energy sector as a priority of the national energy-saving development. The new law of Ukraine “On heat energy supply” (№ 2633-IV from 02.06.2005) regulates all relations in the heat supply market. It does not considerably change the previously existing practices in the market, but stimulates the more rigid energy saving and implementation of energy-saving measures.
efficient technologies. It puts the good targets, but without corresponding program and necessary financial support.

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

In course of project implementation, the following emission reductions will be achieved, at the stages of project implementation:

<table>
<thead>
<tr>
<th>Year</th>
<th>GHG emissions reduction, t CO₂e</th>
<th>Accumulative emission reduction, t CO₂e</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Donetsk Region</td>
<td>Donetsk City</td>
</tr>
<tr>
<td>2006</td>
<td>10886</td>
<td>8403</td>
</tr>
<tr>
<td>2007</td>
<td>45003</td>
<td>15720</td>
</tr>
<tr>
<td>2008</td>
<td>88824</td>
<td>25167</td>
</tr>
<tr>
<td>2009</td>
<td>140091</td>
<td>24830</td>
</tr>
<tr>
<td>2010</td>
<td>138923</td>
<td>24380</td>
</tr>
<tr>
<td>2011</td>
<td>138397</td>
<td>24178</td>
</tr>
<tr>
<td>2012</td>
<td>137521</td>
<td>23841</td>
</tr>
<tr>
<td>Total</td>
<td>688759</td>
<td>138116</td>
</tr>
</tbody>
</table>

*Table 1. Estimated amount of CO₂e Emission Reductions*

Thus the estimated amount of emission reductions over the crediting period is 826 875 tons of CO₂e. For more detailed information see Appendixes 1 – 6.

The amounts of ERUs and AAUs that is proposed by Supplier to the potential buyer are:

**AAUs**

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount (ths tons of CO₂e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>40</td>
</tr>
</tbody>
</table>

Subtotal: 40 ths tons of CO₂e

**ERUs**

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount (ths tons of CO₂e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>90</td>
</tr>
<tr>
<td>2009</td>
<td>140</td>
</tr>
<tr>
<td>2010</td>
<td>140</td>
</tr>
<tr>
<td>2011</td>
<td>140</td>
</tr>
<tr>
<td>2012</td>
<td>140</td>
</tr>
</tbody>
</table>

Subtotal: 650 ths tons of CO₂e

Total: 690 ths tons of CO₂e
A.5. **Project approval by the Parties involved:**

The project is already approved by local authorities, namely Donetsk Regional State Administration, and Ukrainian government representatives, namely Ministry for Environmental Protection of Ukraine and Ministry of Construction, Architecture, Housing and Municipal Economy of Ukraine. Therefore, organizational risk for this project is minimized.

Ministry for Environmental Protection of Ukraine has issued the Letter of Endorsement for this JI project on 16 October, 2006.
**SECTION B. Baseline**

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

**Status and adequacy of the current delivery system**

Current supply of Donetsk region DH systems is primarily based on Ukrainian and Russian made gas, fuel oil and coal fired boilers including DKVR-20/13, DKVR-10/13, DKVR-6.5/13, DKVR-4/13, DE-4/13, Fakel, BGV-50e, KVGM-20, KVGM-6.5, TG-3, TVG-8, TVG-4, Universal, Nadtochiya, NIKA-0.5, HP-18, KVGM-1.25, NIISTU-5, E-1/9G, RL-70, KSVa-0.63, KSV-2.0, KSVa-1.25, Minsk-1, Tutunnika, Revokatova and few other types. Detailed information is presented in Appendix 1 (Boilers) and Appendix 4 (Boilers City). Current efficiencies of those boilers are in the range of 40 - 90%.

Current distribution networks are characterized by heat losses from 20-30% to 35%. Detailed information is presented in Appendix 2 (Networks) and Appendix 5 (Networks City).

**Construction of the Baseline Scenario**

Current operation of the Donetsk region’s district heating system results in continuous deterioration of the heat-generating and distribution equipment, followed by continuous slight efficiency droop. However, at the same time operative maintenance increases efficiency, which pretty much compensates deterioration, and makes annual total emissions level (the Baseline) about the same for years.

Project also provides electric power production on the new cogeneration units. This power will replace consumption from the national power system, that’s why we take into account national standard of power system emissions for Baseline definition.

**Calculation of Baseline Carbon Emission Factors**

For all fuels we used CO\(_2\) emission factors from the data table provided in Annex C of the Operational Guidelines for Project Design Documents of Joint Implementation Projects (Volume 1: General guidelines; Version 2.2).

\[
\text{Cef (natural gas)} = 0.0561 \text{ KtCO}_2/\text{TJ}; \\
\text{Cef (fuel oil)} = 0.0774 \text{ KtCO}_2/\text{TJ}; \text{ (taken as “Residual fuel oil”).} \\
\text{Cef (coal)} = 0.0946 \text{ KtCO}_2/\text{TJ}; \text{ (taken as “Other bituminous coal”).}
\]

We assume that CO\(_2\) emission factors for the fuels will be the same for period 2003-2012. For our calculations we assume that the Lower Heating Value of a fuel (LHV) doesn’t change during that time, however in the Monitoring Plan the LHV factor will be taken into account for the baseline correction for any year until 2012.

LHV of fuels used by RME “Donetskteplocomunenergo” changes insignificantly from year to year. Table 2 gives average Lower Heating Values for fuels that are used by the Applicant:
### Table 2. Lower heating value for fuels used by the Applicant

<table>
<thead>
<tr>
<th>Type of fuel</th>
<th>Average lower heating value of fuel</th>
<th>Gcal</th>
<th>MJ/m³ (MJ/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td></td>
<td>7880</td>
<td>33.1</td>
</tr>
<tr>
<td>Coal</td>
<td></td>
<td>4333</td>
<td>18.1</td>
</tr>
<tr>
<td>Light fuel oil</td>
<td></td>
<td>8738</td>
<td>36.7</td>
</tr>
<tr>
<td>Heavy fuel oil</td>
<td></td>
<td>9571</td>
<td>40.2</td>
</tr>
</tbody>
</table>

### Calculation OF CO₂ Conversion Factor (CF)

CF (Conversion Factor) = LHV (Lower Heating Value)* Cef (Carbon Emission Factor)

1000 m³ of natural gas input = 33.1 [MJ/m³]*0.561 [KtCO₂/TJ] = 1.857 tCO₂

1t of Heavy fuel oil input = 40.2 [MJ/kg]*0.0774 [KtCO₂/TJ] = 3.11 tCO₂

1t of Light fuel oil input = 36.7 [MJ/kg]*0.0774 [KtCO₂/TJ] = 2.84 tCO₂

1t of Coal input = 18.1 [MJ/kg]*0.0946 [KtCO₂/TJ] = 1.712 tCO₂.

### Calculation of Activity Level

Activity level is represented by annual fuel consumption. For calculation of Baseline emissions, the 2003 was taken as the Base year.

<table>
<thead>
<tr>
<th></th>
<th>Baseline Natural Gas Consumption, ths Nm³/yr</th>
<th>Baseline coal Consumption, t/yr</th>
<th>Baseline Light Fuel Oil Consumption, t/yr</th>
<th>Baseline Heavy Fuel Oil Consumption, t/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>RME “Donetskeplcomunenergo”</td>
<td>371435.3</td>
<td>49881.0</td>
<td>997.0</td>
<td>1183.0</td>
</tr>
<tr>
<td>Artemivsk t.</td>
<td>24028.6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Donetsk city</td>
<td>187501.4</td>
<td>339.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>582965.3</strong></td>
<td><strong>50220.0</strong></td>
<td><strong>997.0</strong></td>
<td><strong>1183.0</strong></td>
</tr>
</tbody>
</table>

*Table 3. Baseline fuel consumption*

Detailed information is presented in **Appendix 1 (Boilers)** and **Appendix 4 (Boilers City)**.
**Calculation of Baseline Carbon Emissions**

There are 2 types of GHG emissions involved in the baseline scenario:

1) CO₂ emissions from boilers operated by Donetsk region DH systems. Baseline calculations were based on the assumption that baseline emissions during any report year (2008-2012) remain the same as in the basis year 2003.

2) CO₂ emissions due to electricity consumption from the grid, which will be replaced after installation of CHP units.

Carbon Emission factors (CEF) for electricity generation in Ukraine (factors for 2008-2012 are taken from Table B1 "Baseline carbon emission factors for JI projects generating electricity" of operational Guidelines for PDD's of JI projects (ERUPT 4, Senter, the Netherlands)).

<table>
<thead>
<tr>
<th>Year</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEF tCO₂e/MWh</td>
<td>0.77</td>
<td>0.755</td>
<td>0.74</td>
<td>0.725</td>
<td>0.71</td>
<td>0.695</td>
<td>0.68</td>
<td>0.66</td>
<td>0.651</td>
<td>0.636</td>
</tr>
</tbody>
</table>

*Table 4. Carbon Emission factors (CEF) for electricity generation in Ukraine*

Calculation of resulting annual Baseline Carbon Emissions, that would take place during typical heating season if Donetsk region DH systems remains unchanged, see in **Appendix 7 (Baseline)**. They consist of an exact amount of total CO₂ emissions that took place during the base (2003) year, and additionally of emissions due to electricity consumption from the grid, which will be replaced after installation of CHP units.

**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 anthropogenic emissions of GHG will be reduced due to complex modernization of heat generating and distributing equipment by application of the technologies proposed in the project activities and described above, which include replacement of old obsolete boilers by new ones with higher efficiency, replacement of obsolete coal-fired and fuel oil-fired boilers by the modern gas-fired ones, installation of new modern burners, installation of cogeneration units at 14 boiler houses, renovation of degraded heat distribution networks with using the new insulation and the pre-insulated pipes.

For more obvious description of how the anthropogenic emissions of GHG are reduced below those that would have occurred in the absence of the JI project, we have built a dynamic baseline, which is the function of the stage of project implementation (see Fig. 3).
Additionality of the project

All project activities require substantial investment – about 33 million EUR. Without carbon credits sales the project is not economically favorable for a Supplier, which makes implementation of most activities impossible. More economically feasible and realistic scenario without carbon credits sales is a baseline scenario with very slow reconstruction activities. However, considering degradation of the whole system with efficiency droop at other objects, the overall actual emissions of a Supplier would stay on the same level. This scenario is less environmentally favorable for the near future (including first commitment period 2008-2012), since GHGs emissions of a Supplier will continue to be kept at the same level or even higher, but economically such scenario is more attractive. Sooner implementation of project activities requires substantial expenditures, but also provides substantial GHG emission reductions, and makes project additional.

The financial indicators Net Present Value (NPV) and Internal Rate of Return (IRR) were calculated for two cases of project implementation – with and without the JI mechanism (see Appendix 8). The discount rate of 12 % was used for calculations, which is typical to average in Ukrainian banks.

The simple pay back period without JI mechanism will be 9,0 years, with JI mechanism – 8,5 years.

NPV and IRR of the project for 2013 year (after the commitment period of Kyoto Protocol) without using of JI mechanism will be:

NPV: – 3617.4 ths EUR,
IRR: 5.8 %.

NPV and IRR of the project for 2013 year with using of JI mechanism will be:

NPV: – 1638.2 ths EUR,
IRR: 9.2 %.

In both cases the project is not attractive for investments, but using of JI mechanism enables to improve its attractiveness. Thus the project is additional.
B.3. Description of how the definition of the project boundary is applied to the project:

Greenhouse Gas Sources and Project Boundaries:

Project boundaries for Baseline scenario are represented by black rectangle on the graphical picture on the Fig.4.

![Flowchart of Current Situation](image-url)
Project boundaries for Project scenario are represented by black rectangle on the graphical picture on the Fig. 5.

**Fig. 5. Flowchart of the Project scenario**

**Direct and Indirect Emissions**

Direct on-site emissions: CO₂ from natural gas combustion in boilers (in some cases coal and fuel oil are used as a fuel), NOₓ and CO emission from combustion in the existing boilers/burners, CO₂ emissions from fuel combustion in gas engines on the new CHP units, additional CO₂ emissions from fuel combustion in boilers on the boiler houses due to the too large heat losses in the distribution networks.

Direct off-site emissions: CO₂ emissions from power plant(s) due to electricity consumption from the grid, which will be replaced after installation of CHP units, CO₂ emissions from power plant(s) due to power consumption used for heating by Donetsk region customers. It takes place due to inefficiencies of heat supply service quality for many consumers in the current situation. Exploitation of power heaters is quite typical and widespread. CO₂ emissions from power station(s) due to heat networks power consumption. It is not efficient due to water leakages, and extended networks’ distance.

Indirect on-site emissions: none.

Indirect off-site emissions: CO₂ emissions from fuel extraction and transportation.
### On-site emissions

<table>
<thead>
<tr>
<th>Current situation</th>
<th>Project</th>
<th>Direct or indirect</th>
<th>Include or exclude</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CO₂ emissions from fuel combustion in boilers</strong></td>
<td>Reduced CO₂ emissions from fuel combustion in boilers due to increased efficiency and fuel saving. Additional CO₂ emissions on the boiler houses where the new CHP units will be installed due to additional fuel consumption for CHP</td>
<td>Direct</td>
<td>Include</td>
</tr>
<tr>
<td><strong>NOₓ and CO emission from combustion in existing boilers/ burners</strong></td>
<td>Reduced NOₓ and CO emissions from fuel combustion after boiler / burners’ replacement</td>
<td>Direct</td>
<td>Exclude. NOₓ and CO are not GHGs.</td>
</tr>
<tr>
<td><strong>CO₂ emissions from fuel combustion in boilers on the boiler houses due to the too large heat losses in the networks</strong></td>
<td>Reduced CO₂ emissions from boiler houses due to decreasing of heat losses in the network’s pipes</td>
<td>Direct</td>
<td>Include</td>
</tr>
</tbody>
</table>

### Off-site emissions

<table>
<thead>
<tr>
<th>Current situation</th>
<th>Project</th>
<th>Direct or indirect</th>
<th>Include or exclude</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CO₂ emissions from power plant(s) due to electricity consumption from the grid, which will be replaced after installation of CHP units</strong></td>
<td>Reduced CO₂ emissions from power plant(s)</td>
<td>Direct</td>
<td>Include</td>
</tr>
<tr>
<td><strong>CO₂ emissions from power plant(s) due to power consumption used for heating by Donetsk region customers. It takes place due to inefficiencies of heat supply service quality for many consumers in the current situation. Exploitation of power heaters is quite typical and widespread.</strong></td>
<td>Reduced CO₂ emissions from power plant(s) due to reduction of power consumption for heating by Donetsk region customers. This will take place after project implementation when heat supply service will become more efficient. Exploitation of power heaters will decrease substantially.</td>
<td>Direct</td>
<td>Exclude, not under control of project developer</td>
</tr>
<tr>
<td><strong>CO₂ emissions from power station(s) due to heat networks power consumption. It is not efficient due to water leakages, and extended networks’ distance.</strong></td>
<td>Reduced CO₂ emissions from power station(s) due to reduction of power consumption of rehabilitated heat networks. This will take place due to water leakage decreasing, replacing 4-pipe lines by 2-</td>
<td>Direct</td>
<td>Exclude, not under control of project developer</td>
</tr>
<tr>
<td>CO₂ emissions from fuel extraction and transportation.</td>
<td>Reduced CO₂ emissions from fuel extraction and transportation.</td>
<td>Indirect</td>
<td>Exclude, not under control of project developer</td>
</tr>
</tbody>
</table>

| **Table 5. Project boundaries and sources of emissions** |

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

The baseline is determined by the Institute of Engineering Ecology, project developer and project partner.

See Annex 1 for detailed contact information.

The baseline study will be fulfilled every year of the emission reduction purchasing, to correct adjustment factors which have an influence to the baseline. For more detailed information see paragraph D.1.
SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

January, 2004 (planning, designing); February, 2004 (implementation).

C.2. Expected operational lifetime of the project:

Minimum - 20 years (the nominal lifetime of the new boiler and network equipment). The real average lifetime of the new boiler and network equipment is estimated to be up to 30 – 40 years. Thus the expected operational lifetime of the project may be about 30 years.

C.3. Length of the crediting period:

Earning of the ERUs corresponds to the first commitment period of 2008 – 2012.

Additional earning of the AAUs is anticipated in 2007 (if early crediting will be applicable according to the Ukrainian national JI procedures).

If the post first commitment period under the Kyoto Protocol will be applicable, the crediting period may be expanded up to the end of the expected operational lifetime of the project.
SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

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

Indicator of project performance

The most objective and cumulative factor that will give a clear picture of whether emission reductions really took place – is *fuel saving*. It can be identified as a difference between baseline fuel consumption and fuel consumption after project implementation. If boilers consume fuel at the projected level, than all other relevant indicators such as efficiencies of new boilers and burners, specific gas consumption of CHP units, as well as heat losses in pre-insulated pipes are adequate.

Verification of project performance indicators

RME “Donetskteplocomunenergo” collects data on fuel bought for heating in form of fuel bills. Information on saved fuel will be attached to verification reports on a yearly basis (before April 1st for all years of project implementation) with all relevant documentation and historical information on fuel purchasing transactions made by Supplier.

Verification of Emission Reduction Units and Baseline Scenario

For any project year the baseline scenario will be different due to the influence of external factors such as weather conditions, change in the lower heating value of fuel, number of customers, etc. We will correct the Baseline and the amount of ERUs for all project years with these factors taken into account.

We will use the following methodology:

\[
\text{ERUs} = \Sigma [E_i^b - E_i^r]
\]

The sum is for all boiler houses which are involved into the project.

Breaking down into constituent parts:
ERUs = \[\sum (E_{1i}^b + E_{2i}^b - E_{1i}^r - E_{2i}^r)]

where:

\(E_{1i}^b\) and \(E_{1i}^r\) – CO\(_2\) emissions due to (useful !) fuel consumption for heating and hot water supply service in base and reported year respectively, t CO\(_2\);  
\(E_{2i}^b\) and \(E_{2i}^r\) – CO\(_2\) emissions due to fuel consumption for own needs in base and reported year, t CO\(_2\);  
\(E_{1i}^b\) = LHV\(_b\)* Cef\(_b\)*\(B\)\(_b\)*\(a\)*\(K\)\(_1\)*\(K\)\(_2\)*\(K\)\(_3\)*\(K\)\(_4\)*\(K\)\(_5\)*\(K\)\(_6\) + \(B\)\(_b\)\(^{(1-a)}\)*\(K\)\(_1\)*\(K\)\(_2\)*\(K\)\(_3\)*\(K\)\(_4\)*\(K\)\(_5\)*\(K\)\(_6\)  
\(E_{2i}^b\) = LHV\(_b\)* Cef\(_b\)*\(B\)\(_b\)*\(a\)*\(K\)\(_1\)*\(K\)\(_2\)*\(K\)\(_3\)*\(K\)\(_4\)*\(K\)\(_5\)*\(K\)\(_6\)  
\(E_{1i}^r\) = LHV\(_r\)* Cef\(_r\)*\(B\)\(_r\)*\(b\)\(_r\)  
\(E_{2i}^r\) = LHV\(_r\)* Cef\(_r\)*\(B\)\(_r\)*\(^{(1-b\)\(_r\)}\)

where:

ERUs – emission reduction units, t CO\(_2\);  
LHV – lower heating value, MJ/m\(^3\) (MJ/kg);  
Cef – carbon emission factor, KtCO\(_2\)/TJ;  
B – amount of consumed fuel, 1000 m\(^3\) or tons;  
\(K\)\(_1\), \(K\)\(_2\), \(K\)\(_3\), \(K\)\(_4\), \(K\)\(_5\), \(K\)\(_6\) – adjustment factors.  
a – portion of fuel (heat), consumed for heating purposes;  
\(1-a\) – portion of fuel (heat), consumed for hot water services;  
b\(_b\) and b\(_r\) – portion of delivered heat and consumed fuel with the exclusion of portion used for own needs (usually up to 0.99) in base and reporting years;  
\(b\)\(_i\) index – related to the base year;  
\(b\)\(_r\) index – related to the reporting year.

\(a = \frac{L_h*q*N}{L_h*q*N + L_w*q*N_w}\)

where:

\(L_h\), \(L_w\) – max load for heating and for hot water supply service, Gkal/hour;  
q – re-calculation factor for average heat load during heating period (usually 0.5-0.8);  
N, N\(_w\) – duration of heating period and period of hot water supply service.

If some boiler houses use several types of fuel, the calculations of E are to be made for all types of fuel separately, and results are to be summed.
1. \(K_1\) (change in the lower heating value):
\[K_1 = \frac{\text{LHV}_b}{\text{LHV}_r}\]

2. \(K_2\) (temperature change factor):
\[K_2 = \frac{(T_{\text{in} r} - T_{\text{out} r})}{(T_{\text{in} b} - T_{\text{out} b})}\]

3. \(K_3\) (Changes of heating area):
\[K_3 = \frac{(F_b * k_b + (F_r - F_b) * k_{r(b)})}{F_b * k_b} = 1 + \frac{(F_r - F_b) * k_{r(b)}}{F_b * k_b}\]
If \(F_r > F_b\), \(k_{r(b)} = k_r\); If \(F_r < F_b\), \(k_{r(b)} = k_b\)
If the heating area is increased, we will add it with the new heat conducting rate - \(k_r\), if heating area is decreased, we will subtract it with the old heat conducting rate - \(k_b\).

4. \(K_4\) (Thermal isolation factor of buildings):
\[K_4 = 1 - F_1 * (k_i - k_b) / \{F_b * k_b\}\]
where:
\(F_b\) and \(F_1\) – heating area in base year and heating area of buildings with the new thermal isolation, \(m^2\);
\(k_b\) and \(k_i\) – heat conduction rates with old and new thermal isolation.

5. \(K_5\) (changes of heating period duration):
\[K_5 = \frac{N_r}{N_b}\]

6. \(K_6\) (changes of number of customers):
\[K_6 = \frac{n_r}{n_b}\]
The tables of parameters that will be included in the process of monitoring and verification for ERUs calculation is presented in Paragraphs D.1.1.1 and D.1.1.3. For any year the table with the above-described factors will be updated due to the changes these factors make to the dynamic baseline and amount of ERUs.

### D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:

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

There are no data to be collected in order to monitor emission reductions from the project, because emission reductions will be calculated by means of formulae presented in paragraph D.1.2.2.

### D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO₂ equivalent):

\[ E_t = \sum (B_{(t)} \times LHV_{(t)} \times Cef_i), \]

where:
- \( E_t \) – project emissions in any reported year, t CO₂
- \( B_{(t)} \) – fuel consumption in the project scenario (for each fuel), 1000 m³ (t);
- \( LHV_{(t)} \) – Lower Heating Value for each fuel, MJ/m³(MJ/kg);
- \( Cef_i \) – Carbon Emission Factors for each fuel, Kt CO₂/TJ.

The sum is taken over all boiler-houses.
### 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:

<table>
<thead>
<tr>
<th>ID number (Please use numbers to ease cross-referencing to D.2.)</th>
<th>Data variable</th>
<th>Source of data</th>
<th>Data unit</th>
<th>Measured (m), calculated (c), estimated (e)</th>
<th>Recording frequency</th>
<th>Proportion of data to be monitored</th>
<th>How will the data be archived? (electronic/paper)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuel consumption at boiler houses:</td>
<td>Every Boiler-house</td>
<td></td>
<td></td>
<td>Every two hours</td>
<td>100%</td>
<td>Data journal, (electronic file)</td>
<td>Fuel consumption at boiler houses is the main data which allows to calculate GHG emissions in the report year</td>
</tr>
<tr>
<td>1.1</td>
<td>Natural Gas</td>
<td></td>
<td>1000 m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fuel consumption at boiler houses is the main data which allows to calculate GHG emissions in the report year</td>
</tr>
<tr>
<td>1.2</td>
<td>Coal</td>
<td></td>
<td>ton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fuel consumption at boiler houses is the main data which allows to calculate GHG emissions in the report year</td>
</tr>
<tr>
<td>1.3</td>
<td>Heavy oil</td>
<td></td>
<td>ton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fuel consumption at boiler houses is the main data which allows to calculate GHG emissions in the report year</td>
</tr>
<tr>
<td>1.4</td>
<td>Light oil</td>
<td></td>
<td>ton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fuel consumption at boiler houses is the main data which allows to calculate GHG emissions in the report year</td>
</tr>
<tr>
<td>2</td>
<td>Heating Value calculated by Lower Heating Value</td>
<td>Boiler-house</td>
<td>Fuel Supplier's or Chemical Analysis Lab</td>
<td>Once per month</td>
<td>100%</td>
<td>Supplier's Report or Chem. Lab Analysis Report</td>
<td>Data which allows to calculate GHG emissions in the report year</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Natural Gas, (average value for a season)</td>
<td></td>
<td>MJ/m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fuel consumption at boiler houses is the main data which allows to calculate GHG emissions in the report year</td>
</tr>
<tr>
<td>2.2</td>
<td>Coal, (average value)</td>
<td></td>
<td>MJ/kg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fuel consumption at boiler houses is the main data which allows to calculate GHG emissions in the report year</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Source</td>
<td>Frequency</td>
<td>Type</td>
<td>Notes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>------------</td>
<td>----------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Daily outside temperature in the heating season.</td>
<td>Meteorological Service</td>
<td>°C</td>
<td>m</td>
<td>Every day. 100% Meteorological Service Report (electronic file) Outside temperature is an auxiliary data which allows correcting baseline and project scenario</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Average inside temperature in the heating season.</td>
<td>3 Typical Buildings for all boiler houses</td>
<td>°C</td>
<td>m</td>
<td>Once in a week 100% Paper and electronic Inside temperature is an auxiliary data which allows correcting baseline and project scenario</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Change in the Number of Customers:</td>
<td>Donetsk Regional State Administration and RME “Donetskteplocomunenergo”</td>
<td>Statistics</td>
<td>Once per Quarter 100% Special Reports (electronic files) Auxiliary data which allows correcting baseline and project scenario</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Heating Area</td>
<td></td>
<td>m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2</td>
<td>Number of persons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3</td>
<td>Heat Loss Factor from walls</td>
<td></td>
<td>kJ/m²*K</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heat Insulation Improvement of Some Buildings</td>
<td>Donetsk Regional State Administration and RME “Donetstkeplocomunenergo”</td>
<td>Statistics</td>
<td>Once per Quarter</td>
<td>100%</td>
<td>Special Reports (electronic files)</td>
<td>Auxiliary data which allows correcting baseline and project scenario</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>------------</td>
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<td>------</td>
<td>------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Heating Area of Buildings with Heat Insulation Improvement</td>
<td>m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2</td>
<td>Heat Transfer Factor from walls</td>
<td>kJ/m²*K</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Power production</td>
<td>CHP units</td>
<td>MW</td>
<td>m</td>
<td>Every day.</td>
<td>100%</td>
<td>Data journal, (electronic file)</td>
<td>Data which allows to calculate GHG emissions due to power consumption from the grid in the baseline scenario</td>
</tr>
</tbody>
</table>
D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO₂ equivalent):

\[ E_b = \sum (B_{b(i)} \times \text{LHV}_{b(i)} \times \text{Cef}_i), \]

Where :

- \( E_b \) – baseline emissions, t CO₂
- \( B_{b(i)} \) – fuel consumption in the baseline scenario (for each fuel), 1000m³ (t);
- \( \text{LHV}_{b(i)} \) – Lower Heating Value for each fuel, MJ/m³(MJ/kg);
- \( \text{Cef}_i \) – Carbon Emission Factors for each fuel, Kt CO₂/TJ.

The sum is taken over all boiler-houses.

Baseline and the amount of emissions for all project years can be corrected if adjustment factors from Table 7 is taken into account. Description of formulae which allows correcting baseline emissions is presented in paragraph D.1.1.

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

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

There are no data to be collected in order to monitor emission reductions from the project, because emission reductions will be calculate by means of formulae presented in paragraph D.1.2.2.
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 CO₂ equivalent):

Resulting emission reductions from the project:

$$ERUs = Eb - Er.$$  

where:

- ERUs – emission reduction units, t CO₂;
- Er – project emissions in any reported year, t CO₂
- Eb – baseline emissions, t CO₂

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

No leakage is expected. Dynamic baseline (based on collected monitoring data) will exclude all possible leakages.

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:

<table>
<thead>
<tr>
<th>ID number (Please use numbers to ease cross-referencing to D.2.)</th>
<th>Data variable</th>
<th>Source of data</th>
<th>Data unit</th>
<th>Measured (m), calculated (c), estimated (e)</th>
<th>Recording frequency</th>
<th>Proportion of data to be monitored</th>
<th>How will the data be archived? (electronic/paper)</th>
<th>Comment</th>
</tr>
</thead>
</table>
D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO₂ equivalent):

No leakages are expected.

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 CO₂ equivalent):

GHG emission reductions from the project are estimated by means of the following formulae:

\[ \text{ERUs} = \text{E}_b - \text{E}_r. \]

where:
- \( \text{ERUs} \) – emission reduction units, t CO₂;
- \( \text{E}_r \) – project emissions, t CO₂;
- \( \text{E}_b \) – baseline emissions, t CO₂

**Baseline emissions**

Baseline emissions consist of two types of GHG emissions:

1) CO₂ emissions from boilers operated by the Applicant.
2) CO₂ emissions due to electricity consumption from the grid, which will be replaced after installation of CHP units.

\[ \text{E}_b = \text{E}_{\text{heat}} + \text{E}_{\text{el}} \]

Where:
- \( \text{E}_{\text{heat}} \) – emissions from boilers operated by the Applicant, t CO₂;
- \( \text{E}_{\text{el}} \) – emissions due to electricity consumption from the grid, which will be replaced after installation of CHP units, t CO₂.

1) Emissions from heat generating sources operated by an Applicant:

\[ \text{E}_{\text{heat}} = \sum (B_{b(i)} \times \text{LHV}_{b(i)} \times \text{Cef}_i), \]

where:
- \( B_{b(i)} \) – fuel consumption in the baseline scenario (for each fuel), 1000 m³ (t);
LHV_{b(i)} – Lower Heating Value for each fuel, MJ/m³ (MJ/kg);
Cef_i – Carbon Emission Factors for each fuel, Kt CO₂/TJ.

2) Baseline emissions due to electricity consumption from the grid, which will be replaced after installation of CHP units:

E_{el}= Power production * CEF electricity generation,
where:
Power production – annual power production of CHP units which will be installed by the Applicant, MWh;
CEF electricity generation – Carbon Emission factors for electricity generation in Ukraine, tCO₂e/MWh, see Table 4.

The heat that will be generated on these CHP units will be used for hot water supply service. For more detailed information see Appendix 3 (CHP), Appendix 6 (CHP City) and Appendix 8 (Baseline).

Project emissions

Project scenario emissions from boiler-houses and new CHP units are a sum of actual fuel amounts to be used in any report year (starting from 2009) multiplied by corresponding conversion factors (CF). Actual – means with subtracted fuel saving due to improving of the network efficiency:

E_r= \sum ([B_{b(i)} - V_{(i)}] * LHV_{r(i)} * Cef_i),
where:
E_r – project emissions in any reported year, t CO₂;
B_{b(i)} – fuel consumption in the project scenario (for each fuel), 1000 m³ (t);
V_{(i)} – fuel saving due to network rehabilitation for each fuel, 1000 m³ (t);
LHV_{r(i)} – Lower Heating Value for each fuel, MJ/m³ (MJ/kg);
Cef_i – Carbon Emission Factors for each fuel, Kt CO₂/TJ.

B_{b(i)} = [B_{b(i)} * LHV_{b(i)} * (Baseline Boilers Efficiency)] / [LHV_{r(i)} * (Project Boilers Efficiency)],

V_{(i)} = B_{b(i)} - B_{(i)} * (100-L_b)/(100-L_r),
where:
B_{b(i)} – fuel consumption in the baseline scenario (for each fuel), 1000 m³ (t);
L_b – heat losses in the network in the baseline scenario, %;
L_r – heat losses in the network in the project scenario, %.

For more detailed information see Appendix 1 (Boilers), Appendix 2 (Networks) and Appendix 4 (Boilers City), Appendix 5 (Networks City).
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 common Ukrainian practice for such type projects, the environmental impact of the project will be estimated by fuel consumption and combustion.

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:

<table>
<thead>
<tr>
<th>Data (Indicate table and ID number)</th>
<th>Uncertainty level of data (high/medium/low)</th>
<th>Explain QA/QC procedures planned for these data, or why such procedures are not necessary.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of natural gas consumed by boiler houses.</td>
<td>Low for gas.</td>
<td>Every year after heating season the calibration of gas flow meters is performed.</td>
</tr>
<tr>
<td>Amount of fuel oil consumed by boiler houses.</td>
<td>Low for fuel oil</td>
<td></td>
</tr>
<tr>
<td>Amount of coal consumed by boiler houses.</td>
<td>Low for coal</td>
<td></td>
</tr>
<tr>
<td>Outside temperature.</td>
<td>Low</td>
<td>Outside temperature data from two boiler houses located in the same city should be similar.</td>
</tr>
<tr>
<td>Inside temperature.</td>
<td>Low</td>
<td>Each boiler house operator who uses services of the boiler house he operates will be responsible for accurate data acquisition during heating season.</td>
</tr>
<tr>
<td>Fuel quality (Lower Heating Values).</td>
<td>Low</td>
<td>Even though there is no need to mistrust fuel suppliers, the Supplier will periodically check the data provided by fuel suppliers through performing chemical analyzes of supplied fuel. Once every season.</td>
</tr>
</tbody>
</table>
Number of customers (heating area) | Low | No quality assurance is needed.

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

The operational structure will include operation departments (adjustment and alignment, etc.) of Supplier (RME “Donetskteplocomunenergo”) and boiler house operation personnel.
The management structure will include management departments of Supplier and specialists of project developer (Institute of Engineering Ecology).

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

The monitoring plan is determined by the Institute of Engineering Ecology and RME “Donetskteplocomunenergo”.
See Annex 1 for detailed contact information.
SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Project Carbon Emission Factors are assumed equal to the Baseline Carbon Emission Factors.

Calculation of Project Activity Level

Project’s activity level, estimated by fuel consumption, will be reduced comparing to the baseline activity level due to fuel saving.

<table>
<thead>
<tr>
<th></th>
<th>Project Natural Gas Consumption, ths Nm³/yr</th>
<th>Project coal Consumption, t/yr</th>
<th>Project Natural Gas Saving due to network rehabilitation, ths Nm³/yr</th>
<th>Project coal Saving due to network rehabilitation, t/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>RME “Donetskteplocomunenergo”</td>
<td>387147.2</td>
<td>2599.6</td>
<td>20102.6</td>
<td>259.0</td>
</tr>
<tr>
<td>Artemivsk t.</td>
<td>23 218.7</td>
<td>0</td>
<td>1497.8</td>
<td>0</td>
</tr>
<tr>
<td>Donetsk city</td>
<td>189452.3</td>
<td>0</td>
<td>6780.7</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>599818.2</strong></td>
<td><strong>2599.6</strong></td>
<td><strong>28381.1</strong></td>
<td><strong>259.0</strong></td>
</tr>
</tbody>
</table>

Table 9. Project fuel consumption

Detailed information is presented in Appendix 1 (Boilers), Appendix 2 (Networks) and Appendix 4 (Boilers City), Appendix 5 (Networks City).

Estimation of Direct Project Emissions

<table>
<thead>
<tr>
<th></th>
<th>Project Emissions, t CO₂</th>
<th>Project Emissions Reduction due to network rehabilitation, t CO₂</th>
<th>Total Project Emissions, t CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>RME “Donetskteplocomunenergo”</td>
<td>723349</td>
<td>37801</td>
<td>685548</td>
</tr>
<tr>
<td>Boiler houses</td>
<td>689204</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHP units</td>
<td>34 145</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Artemivsk t.</td>
<td>43 115</td>
<td>2781</td>
<td>40334</td>
</tr>
<tr>
<td>Donetsk city</td>
<td>351796</td>
<td>12591</td>
<td>339205</td>
</tr>
<tr>
<td>Boiler houses</td>
<td>338368</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHP units</td>
<td>13428</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1118260</strong></td>
<td><strong>53173</strong></td>
<td><strong>1065087</strong></td>
</tr>
</tbody>
</table>

Table 10. Project Emissions of CO₂ after project implementation

Project emissions are ~ 1 065 087 t CO₂
E.2. Estimated leakage:

We assume that possible leakage is negligible that is less than 1% of the total direct emissions. These indirect emissions are not under control of project developer so we do not include them in calculations.

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

Project Emissions + Leakages = 1 065 087 + 0 = 1 065 087 t CO₂.

E.4. Estimated baseline emissions:

Baseline emissions consist of two types of GHG emissions:
1) CO₂ emissions from boilers operated by the Applicant.
2) CO₂ emissions due to electricity consumption from the grid, which will be replaced after installation of CHP units.

<table>
<thead>
<tr>
<th>Baseline Emissions, t CO₂</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RME “Donetskteplocomunenergo”</td>
<td>781642</td>
</tr>
<tr>
<td>Artemivsk town</td>
<td>44 619</td>
</tr>
<tr>
<td>Donetsk city</td>
<td>348 754</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>1 175 015</strong></td>
</tr>
<tr>
<td>Emissions due to electricity consumption from the grid, which will be replaced after installation of CHP units at boiler houses belonging to RME “Donetskteplocomunenergo”</td>
<td>37 143</td>
</tr>
<tr>
<td>Emissions due to electricity consumption from the grid, which will be replaced after installation of CHP units at boiler houses belonging to MCE “Donets’kteplovorezha”</td>
<td>14 292</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>51 435</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1 226 450</strong></td>
</tr>
</tbody>
</table>

Table 10. Baseline Emissions of CO₂

Baseline emissions ~ 1 226 450 t CO₂.

More detailed calculation of resulting annual Baseline Carbon Emissions, that would take place during typical heating season if RME “Donetskteplocomunenergo” DH system, remains unchanged, see in section B and Appendix 4 (Baseline).
E.5. Difference between E.4. and E.3. representing the emission reductions of the project:

Project Emission Reduction = Baseline emission-(Project emission + Estimated leakage) = 1 226 450 - 1 065 087 = 161 363 t CO₂ / yr.

In course of the project implementation, the different emission reduction will be achieved at the different stages of project implementation. The amounts of emission reduction are represented in the Table 1. Paragraph A.4.3.1.

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

See Appendixes 1 – 7.
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:

RME “Donetskteplocomunenergo” has the necessary Environmental Impact Assessment for its activity according to Ukrainian legislation. The text is available in Russian. Title-page of valid Environmental Impact Assessment for RME “Donetskteplocomunenergo” is shown in Appendix 9.

Overall, the project “Rehabilitation of the District Heating System in Donetsk Region” will have a positive effect on environment. Following points will give detailed information on environmental benefits.

1. Project implementation will allow saving over 11 million Nm\(^3\) of natural gas and over 47 thousand ton of coal per year starting from 2009. Natural gas and coal are a non-renewable resources and its economy is important.

2. Project implementation will reduce direct CO\(_2\) emissions from city and regional boilers by 110 thousand tons per year starting from 2009 due to increased boilers efficiencies, achieved through installation of up-to-date boiler equipment, particularly new boilers, CHP units and installation of pre-insulated networks pipes (137 km) instead of existing regular networks pipes.

3. Due to fuel economy and new environmentally friendlier technologies of fuel combustion, project implementation will reduce emissions of SO\(_x\), NO\(_x\), CO and particulate matter (co-products of combustion).

4. It is expected that due to a better DH service Donetsky region’s population will reduce electricity consumption from electric heaters thus reducing power plants emissions of CO\(_2\), SO\(_x\), NO\(_x\), CO and particulate matter.

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:

Impact on the water medium

Impact on the water medium is present. Impact on water resources is will be the same as in baseline scenario. The existing technology of heat energy production exploited at the objects of RME “Donetskteplocomunenergo” foresees discharging of waste water to the sewage network with obligatory chemical control in accordance to Water Code of Ukraine, GOST 28.74-82 “Hygienic regulations and quality control”, SNiP 4630-92 on determining maximum concentration limits for internal water bodies. Discharge of wastewater to the open water bodies will not take place.

Project implementation will have positive environmental effect. It will allow to decrease the water consumption and as a result – to decrease the amount of waste water.
Effects on the ambient air
The project implementation will have positive effect on ambient air:
- Reduction of NO$_x$, SO$_x$, CO and PM due to application of cleaner technologies at boiler houses;
- Reduction of electricity consumption results in lower emissions of the same air pollutants;
- Heat stress on the atmosphere (due to lower temperatures of flue gases);
- Lower emissions per unit of fuel at the same load on boiler house.

Effects on land use
Impact on the land medium is not present.
Relevant regulation is the sphere of land use is presented by the Land Code of Ukraine. National technological practice / standard: GOST 17.4.1.02.-83 “Protection of Nature, Soils. Classification of chemical substances for pollution control”.

Effects on biodiversity
Impact on biodiversity is not present.

Waste generation, treatment and disposal
Waste generation, treatment and disposal are present. In the process of project implementation the generation of waste will occur after disassembling of physically and morally obsolete equipment, burners, pipes, etc. Also there will occur some construction waste due to destruction of boiler settling, boiler house foundations, etc.
Possible recycling of the old equipment will by definition have a positive effect on the environment.
SECTION G. Stakeholders’ comments

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

Since the project is considered to have no negative environmental or social impacts, no local stakeholder consultations have been conducted. The authorities in Donetsk Region have expressed the strong support for the project.
Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

<table>
<thead>
<tr>
<th>Supplier:</th>
<th>Regional Municipal Enterprise “Donetskteplocomunenergo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation:</td>
<td>Regional Municipal Enterprise “Donetskteplocomunenergo</td>
</tr>
<tr>
<td>Street/P.O.Box:</td>
<td>Donetsk</td>
</tr>
<tr>
<td>Building:</td>
<td>38</td>
</tr>
<tr>
<td>City:</td>
<td>Donetsk</td>
</tr>
<tr>
<td>State/Region:</td>
<td>Donetsk</td>
</tr>
<tr>
<td>Postal code:</td>
<td>83086</td>
</tr>
<tr>
<td>Country:</td>
<td>Ukraine</td>
</tr>
<tr>
<td>Phone:</td>
<td>+38 062 335-00-26</td>
</tr>
<tr>
<td>Fax:</td>
<td>+38 062 304-62-95</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:postmaster@kpdtke.donetsk.ua">postmaster@kpdtke.donetsk.ua</a></td>
</tr>
<tr>
<td>URL:</td>
<td></td>
</tr>
<tr>
<td>Represented by:</td>
<td></td>
</tr>
<tr>
<td>Title:</td>
<td>General director</td>
</tr>
<tr>
<td>Salutation:</td>
<td>Mr.</td>
</tr>
<tr>
<td>Last name:</td>
<td>Vorotyntsev</td>
</tr>
<tr>
<td>Middle name:</td>
<td>Albertovich</td>
</tr>
<tr>
<td>First name:</td>
<td>Vasyl</td>
</tr>
<tr>
<td>Department:</td>
<td></td>
</tr>
<tr>
<td>Phone (direct):</td>
<td>+38 062 335-00-26</td>
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<tr>
<td>Fax (direct):</td>
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<tr>
<td>Mobile:</td>
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<tr>
<td>Personal e-mail:</td>
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</tbody>
</table>
**Partner - Project developer:**

<table>
<thead>
<tr>
<th>Organisation:</th>
<th>Institute of Engineering Ecology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street/P.O.Box:</td>
<td>Zheliabova str.</td>
</tr>
<tr>
<td>Building:</td>
<td>2A</td>
</tr>
<tr>
<td>City:</td>
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</tr>
<tr>
<td>State/Region:</td>
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</tr>
<tr>
<td>Postal code:</td>
<td>03057</td>
</tr>
<tr>
<td>Country:</td>
<td>Ukraine</td>
</tr>
<tr>
<td>Phone:</td>
<td>(+38 044) 453 28 62</td>
</tr>
<tr>
<td>Fax:</td>
<td>(+38 044) 456 92 62</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:engeco@kiev-page.com.ua">engeco@kiev-page.com.ua</a></td>
</tr>
<tr>
<td>URL:</td>
<td><a href="http://www.engecology.com">www.engecology.com</a></td>
</tr>
<tr>
<td>Represented by:</td>
<td></td>
</tr>
<tr>
<td>Title:</td>
<td>Director</td>
</tr>
<tr>
<td>Salutation:</td>
<td>Dr.</td>
</tr>
<tr>
<td>Last name:</td>
<td>Sigal</td>
</tr>
<tr>
<td>Middle name:</td>
<td>Isakovich</td>
</tr>
<tr>
<td>First name:</td>
<td>Oleksandr</td>
</tr>
<tr>
<td>Department:</td>
<td></td>
</tr>
<tr>
<td>Phone (direct):</td>
<td>(+38 044) 453 28 62</td>
</tr>
<tr>
<td>Fax (direct):</td>
<td>(+38 044) 456 92 62</td>
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<td>Mobile:</td>
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<td>Personal e-mail:</td>
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</tbody>
</table>
Annex 2

BASELINE INFORMATION

See Section B for the Baseline information
Annex 3

MONITORING PLAN

See Section D for the Monitoring plan
Annex 4

LETTER OF ENDORSEMENT

(English translation)

To: Regional Municipal Enterprise “Donetskteplokomunenergo”
Donetsk city, Donetsk str., 38

LETTER OF ENDORSEMENT FOR THE JI-PROJECT

“Rehabilitation of the District Heating System in Donetsk Region ”

The Ministry of Environmental Protection of Ukraine as official and authorized representative of Ukraine has observed the project “Rehabilitation of the District Heating System in Donetsk Region” (hereinafter referred to as “JI project”), submitted by the Regional Municipal Enterprise “Donetskteplokomunenergo”, which is located in the Donetsk city, Donetsk street, bld. 38 (further-Applicant) and hereby informs that:

1. Ukraine has ratified the Kyoto Protocol.

2. For the participation in the activity according to Article 6 of Kyoto Protocol, Ukraine have to meet the conditions of decisions of the 11th Conference of Parties to the United Nations Framework Convention on Climate Change, which at the same time was the 1st Meeting of Parties to the Kyoto Protocol (Montreal, November 2005).

3. The Ministry of Environmental Protection of Ukraine has observed the JI project and is informed that Applicant has the intention to sell the received emission reduction units (ERUs) to the register of country-buyer. The Ministry of Environmental Protection of Ukraine will estimate the JI project to the conformity to the Ukrainian criteria of JI projects and will begin negotiations with Applicant concerning the distribution of received ERUs. The Ministry of Environmental Protection of Ukraine supports the further JI project development and undertakes to give, in case of need, the necessary perception in carrying out of independent expertise, control and transfer of ERUs.

4. In case of positive estimation of JI project the Ministry of Environmental Protection of Ukraine will consider the point of issue of the official approval for the JI project, which will allow transferring the ERUs to the account of country-buyer.

5. In case of JI project implementation before the 1st of January, 2008, and achieving by it the GHG emission reduction in the period before 2008, the Ministry of Environmental Protection of Ukraine will consider the point concerning transfer of Assigned Amount Units (AAUs) to the country-buyer exclusively in the volumes, created in the result of the JI project implementation before 2008, through the mechanism of emissions trading according to the Article 17 of Kyoto Protocol. Ukraine agrees to use for AAUs the same method of control, which is used for ERUs control.

First Vice- Minister                                               S.S. KURULENKO
ОКП „Донецьк青少年enerго”
м. Донецьк, вул. Донецька, 38

ЛИСТ-ПІДТРИМКИ ПРОЕКТУ СПІЛЬНОГО ВПРОВАДЖЕННЯ
„Реконструкція системи теплопостачання в Донецькій області”

Міністерство охорони навколишнього природного середовища України, як офіційний і уповноважений представник України, розглянуло проект „Реконструкція системи теплопостачання в Донецькій області”, (далі проект СВ), поданий Обласним комунальним підприємством „Донецьк青少年enerго”, що розташоване в місті Донецьку, вул. Донецька 38, надали – Заявник, та заявляє:

1. Україна ратифікувала Кютський протокол.
2. Для участі у діяльності відповідно до статті 6 Кютського протоколу Україна має відповідати вимогам Рішення 11 Конференції Сторін Рамкової конвенції ООН про зміну клімату, яка відбулася 1997 році.
3. Міністерство охорони навколишнього природного середовища України розглянуло проект СВ та проінформоване, що Заявник має намір продати отримані одиниці скорочення викідів (ОСВ) зацікавлених компанії із зарахуванням ОСВ до реєстру країни-покупця. Міністерство охорони навколишнього природного середовища України оцінить проект СВ на відповідність українським критеріям проектів спільного впровадження та розпочне переговори із Заявником щодо розподілу отриманих ОСВ. Міністерство охорони навколишнього природного середовища України підтримує подальшу розробку проекту СВ та зобов’язується надавати, у разі потреби, необхідне сприяння у здійсненні незалежної експертизи, перевірки та передачі ОСВ.

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.
4. У разі позитивної оцінки проекту СВ Міністерство охорони навколишнього природного середовища України розгляне питання щодо надання офіційного схвалення проекту СВ, що дозволить передати ОСВ на рахунок країни-покупця.

5. У разі впровадження проекту СВ до 1 січня 2008 р. та досягнення ним скорочення викидів парникових газів у період до 2008 року, Міністерство охорони навколишнього природного середовища України розгляне питання щодо передачі країні-покупцю однією встановленої кількості (ОВК) виключно в обсягах, створених в результаті здійснення проекту СВ до 2008 року, через механізм торгівлі викидами згідно Статті 17 Кютського протоколу. Україна погоджується застосовувати той самий метод перевірки ОВК, який застосовується для перевірки ОСВ.

Перший заступник
Міністра

Куруленко С. С.

Веремійчик
t. 2063308