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

CONTENTS

Annexes

SECTION A. General description of the project

A.1. Title of the project:

"Utilization of Coal Mine Methane at the Coal Mine Sukhodilska-Skhidna".

Sectoral Scope 8. Mining/mineral production[1]
PDD version 4.9, dated 21 October 2008.

A.2. Description of the project:

Gassy underground coal mines are designed and operated in such way that methane liberated during the extraction of coal is removed from the mine through powerful ventilation fans which are part of a system that ensure safe working conditions in the mine. For particularly gassy mines, operators may employ additional methane drainage systems to supplement their ventilation systems in order to maintain a safe working environment. Gas may be removed prior to mining through surface goaf wells or recovered and pumped to the surface in the process of removing gas via an underground drainage system. Utilization of recovered methane is not currently an important operational practice at underground coal mines. As usual Coal Mine Methane (CMM) produced from drainage systems also has limited commercial application, and as a result is released to the atmosphere.

The purpose of this project is the avoidance of methane emissions into the atmosphere at the Coal Mine "Sukhodilska-Skhidna"[2], further referred to the Sukhodilska mine or simply the mine. There are three sources of CMM at the Mine: from surface wells, through underground drainage system and from ventilation. Only surface CMM will be considered in this PDD. The Coal Mine Methane, produced by surface wells at Sukhodilska, will be used to replace heat currently produced by coal boilers. Two CMM fired boilers will supply heat to the mine. The existing on-site coal boilers will be shut down.

As it was boiler house using standard characteristics, the designing documents were completed at the end of 2005. The assembling and installation of new CMM boiler replacing existing coal boilers, was started at the beginning of year 2006. Commissioning and adjustment works were carried out during winter-summer of year 2006.During this period working in testing mode new boiler supplied heat and hot water to the mine. At the 7 August 2006 the official commissioning of the first boiler took place.

[1] http://ji.unfccc.int/AIEs/CallForInputs/index.html

[2] The English transliteration of the official Ukrainian name of the mine will be used throughout the text. The Russian name of the mine would translate into English as Sukhodolskaya-Vostochnaya

A.3. Project participants:

Please list project participants and Parties involved and provide contact information in annex 1. Information shall be indicated using the following tabular format.		
Party involved	Legal entity project participant (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (Host party)	JSC “Krasnodonvuhillya”	No
Netherlands	ING Bank N.V.	No

Table 1: Project participants

JSC “Krasnodonvuhillya” is the legal entity that is managing and owning the mine Sukhodilska-Skhidna. ING Bank N.V. purchases the resulting emission reductions from this project.

A.4. Technical description of the project:

A.4.1. Location of the project:

The project is located in the Krasnodon region of the Luhansk oblast which is situated in the eastern part of Ukraine. Geographical location of the project is shown on the maps below.

A.4.1.1. Host Party(ies):

Ukraine.

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

Luhansk (Voroshilovograd) region.

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

Sukhodilsk, Krasnodon District

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

The project is located at the Coal Mine named Sukhodilska-Skhidna. The mine has one site. The project’s measures will influence at the heat flow and emissions at this site. The coal mine is located not far from the town Sukhodilsk. The locations of the mine and project area are shown on the maps below.

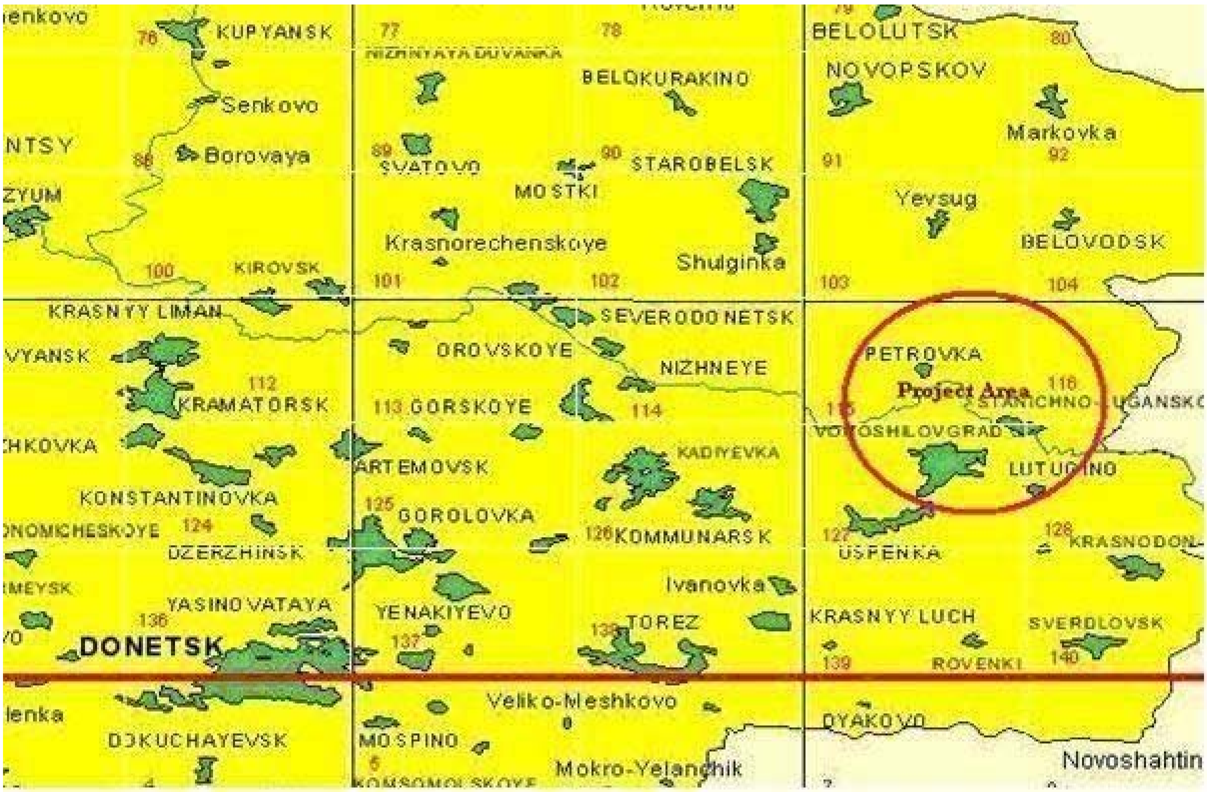

Figure 1: Location of Krasnodon (Luhansk region)

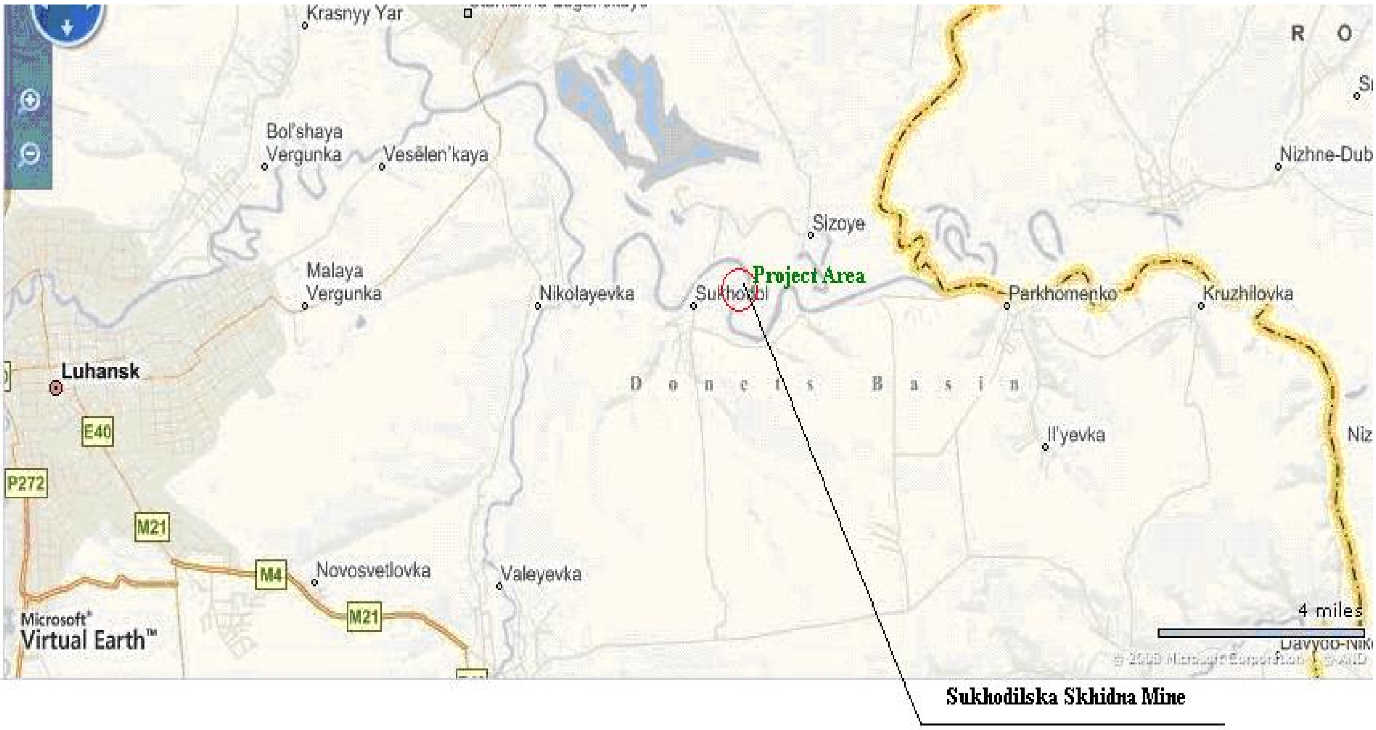

Figure 2: Location of Sukhodilska-Skhidna Mine
(GPS-coordinates are: Longitude 39^{0}47'9"; Latitude: 48^{0}21'9")

Figure 3: Sukhodilska-Skhidna Mine's facilities.

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

The Donetsk basin (Donbass) is the largest industrial region of Ukraine with coal, metallurgic and chemical industries. Donbass is one of the most hazardous regions of Ukraine in terms of environmental pollution. The main contributor of methane emissions to the atmosphere is the coal industry. Methane reserves in carboniferous deposits are estimated from 12 to 25 trillion m^3.

Every year, many millions of cubic meters of methane gas (CH_4) are released from the coal mines in Donbass. The methane, present in large quantities in the porous structure of coal, is released by degasification activities and ventilating air circulating in the mine and then discharged into atmosphere leading thus to global warming as methane is # 2 greenhouse gas regulated by the Kyoto Protocol.

In the Luhansk region there are hard coal mining activities for more than a hundred years. In the whole area there are lots of active and abandoned coal mines. Only a few of the active coal mines have an active CMM suction system in the underground. Most of the coal mines are drilling passive degassing wells with a depth of 200-500 m for solving the occurring gas problem. Usually the wells are drilled before the beginning of the coal mining activity. Because the gas pressure in the coal mine is slightly higher then in the atmosphere, the CMM can exhaust by natural ventilation and no compressors are needed. The degassing activity of some of the wells is only short, whereas most of the wells keep their activity constant over years, even long after the coal mining is ended and the coal mine is abandoned. So there are lots of active wells and also some inactive and abandoned wells in the Luhansk region. Most of the existing degassing wells are located in the steppe far away from residential and industrial areas, so that is often impossible to utilise the CMM for heat or power generation economically. The wells are mainly located outside of the cities because the actual mining activities are also outside and because there is no hazard caused by the exhausting CMM in the steppe.

The Sukhodilska coal mine has been under development since 1980.

No	General information Sukhodilska-Skhidna coal mine[3]	
1	Total Mineable Reserves, thousand tonnes	157,402
2	Mineable Reserves, Active Mine Levels, thousand tonnes	43,627
3	Total Mining Area, km2	58
4	Depth of Shaft(s), m	577–1,044
5	Mining Capacity, tonnes / day	2,000
6	Annual Electricity Consumption, MWh	78,819
7	Coal Consumers Coke and Chemical Plants	
8	Annual Heat Consumption, GJl	275,379
9	Type(s) of Boilers[4]	DKVR 20/13: 2 units E 1/9: 6 units NIISTU-5: 2 units
10	Boilers Fuelled with Coal	
11	Fuel Demand Self-covered by the Mine, percent	100

Table 2: General information[5]

[3] All the data in Tables and Charts present the situation before year 2003
[4] All boilers will be dismantled and replaced with two CMM fuelled Boilers KE 10/14 in July 2006 and September 2007
[5] Here and after the source for the Section A 4.2 is Handbook "Coal mine methane in Ukraine: opportunities for production and investment in the Donetsk coal basin", U.S. Environment Protection Agency, 2001.

Geological information of the mine

The mining property is located in three geologic sections and is a part of the Krasnodonvuhillya Coal Association. There are many small settlements on the mine reserve area and surrounding territory. The large towns near the mine are Krasnodon, Sukhodilsk and Molodogvardeysk. The traffic system, consisting of railway and highways, is well developed in the region. The surface area is a prairie-type flatland that is crisscrossed by multiple gullies and ravines. The coal deposit is located at the watershed of the Severskiy Donetsk and Bolshaya Kamenka Rivers. The elevation ranges from 196 meters above sea level to 50 meters at the lowest points.

1. Coal Seam Gas Content, Range, m^3 /tonne	17 to 30
2. Geothermal and Pressure Gradients:	
Geothermal, °Ñ/100 m	2.5
Pressure, MPa / 1,000 m	N/A
3. Overburden Composition:	
Sandstone, percent	37
Shale, percent	58
Limestone, percent	2
4. Number of Coal Seams Above Currently Mined	7
5. Aggregate Thickness of Seams Above Currently Mined, m	6.5
6. Geologic Phenomena	Faults: Duvanny
7. Gas Pressure in Surrounding Rock Strata, MPa	N/A
8. Porosity and Permeability, Sandstone:	
Porosity, percent	N/A
Permeability, mD	4.6–6.6
9. Total Methane Resource, billion m^3, including:	
Coal Seams, billion m^3	4.0
Satellite Seams, billion m^3	2.8
Sandstone, billion m^3	N/A

Table 3: General Geologic Information, Sukhodilska-Skhidna Mine

	Coal Seam: i_3^1
1. Rank of Coal	High-vol bituminous A
2. Seam Thickness, m	0.7–2.2
3. Pitch, degrees	5–14
4. Depth of Mining, m	785–1,028
5. Ash Content:	
Coal in Place, percent	14.5
Run of Mine Coal, percent	47.7
6. Moisture, percent	4.0
7. Sulfur Content, percent	1.1
8. Gas Content, m^3 per tonne of daf coal	16.9–29.9
9. Mining Method	Longwall
10. Roof Control Method	Complete caving
11. Panel Width, m	180–190
12. Mining Equipment	2KMT, KM-98

Table 4: Geologic and Mining Conditions, Sukhodilska-Skhidna Mine

Year	Coal Production, thousand tones/year	Methane Liberated Million m^3/year	Methane Utilized m^3/year
2002	413.9	N/A	0.00
2003	601.4	48.6	0.00
2004	468.8	32.1	0.00
2005	789.5	48.6	0.00
2006	845.3	95.8	829 200
2007 (forecast)	1000.0	100.0	2 185 601
2008 (forecast)	1500.0	101.0	11 600 000
2009 (forecast)	1500.0	100.6	11 700 000
2010 (forecast)	1500.0	100.0	11 800 000
2011 (forecast)	1500.0	105.6	12 000 000
2012 (forecast)	1500.0	102.0	12 000 000

Table 5: Coal Production, Methane Emissions and Utilization, Sukhodilska-Skhidna Mine

Degasification activities

High methane content is among the key factors determining the complexity of coal recovery and its high production cost at the Sukhodilska Coal Mine. The methane presence and the threat of methane-air mix explosion hamper the progress of the mining works and demand to increase safety working conditions of miners. Statistical survey of fatal accidences occurred in mines witnesses that the great majority of those relate directly to ignition and explosion of methane. The President of Ukraine and the Government preoccupied with concerns on providing safety for coal miners have issued several decrees to support and to regulate activities to be implemented:

- The Decree of the President of Ukraine as of 16th of January 2002 # 26/2002 "On urgent activities for improvement of work conditions and development of the state supervision at mining enterprises";
- The Governmental Decree as of 6th of July 2002 # 939 has approved the Complex Programme of coal-beds degasification at coal mines.

Both decrees focus on improving the safety of the mines, but do not require any utilization of the CMM. According to both decrees there is no necessity to neither flare nor utilize captured CMM.

No	Parameter	Indicator
1	Number of Pumping Stations	3
2	Number of Surface Degassing Points	3
3	Number of Pumps 50 m^3/min.Capacity	13
4	Number of Longwalls Degassed	3
5	Average Degasification Statistics,jan to June 1999:	
	• Methane –air Mixture Consumed,m^3/min	90.0
	• Methane Content, percent	15.0
	• Methane Capture Rate, m^3/min	13.5
6	Length of Pipeline, m	12,000

Table 6: degasification parameters Sukhodilska-Skhidna Mine

To comply with provisions of the Complex Programme from year 2003, the Sukhodilska-Skhidna Coal Mine is implementing its own degasification project that envisages drilling underground boreholes, introduction of vacuum pumping stations (VPS). As of 1st January 2008, the progress of the degasification project is as follows:

- 12 km of degasification pipelines has been laid out;
- Four[6] vacuum pumping stations are in operation: one of them underground and three are the surface stations.
- daily methane captured flow rate is 56.1 m^3/min. (including methane for boiler house)
- Five new surface wells supply methane for boiler house at the moment

The five new surface wells will release about 35 m^3/min of air mixture with a concentration of approximately 70% or 9229 tCH4/year.

[6] Underground VPS has one unit 50m^3/min; The three surface VPS have seven units 50 m^3/min and one unit 150m^3/min

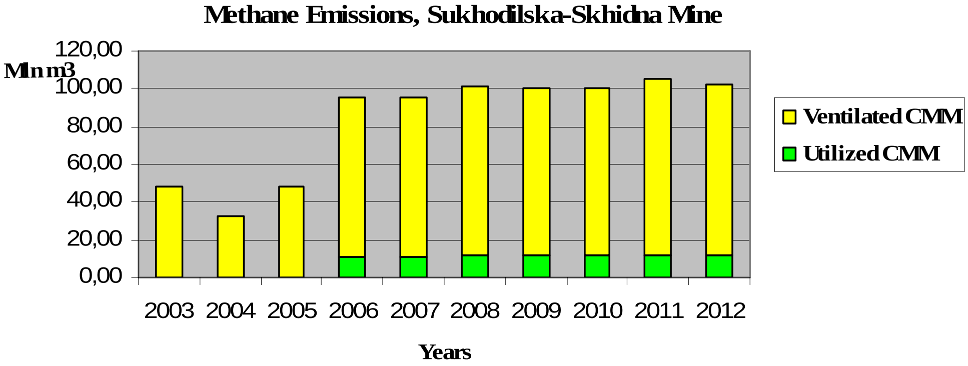

Chart 1: Methane Emissions, Sukhodilska-Skhidna Mine

Utilization of methane captured (the project)
The implementation of the degasification programme at the Sukhodilska-Skhidna Coal Mine contributes to environmental pollution and leading to climate change due to increasing the drainage of coal mine methane (CMM) into the atmosphere. To prevent methane emissions and use opportunities provided by the Joint Implementation mechanism, the Mine started CMM utilization projects by introducing best available technologies based of utilizing the methane energy content.

According to the Mine Development business plan it is planned to install:

- Stage 1: Two CMM fuelled boilers instead of existing three coal boilers to supply heat and hot water for the Mine.[7]
- Stage 2: Three flaring systems;
- Stage 3: Five CHP units with 1 MW of capacity each.

The mine has only considered stage 1 for the following reasons:

- Stage 2 & Stage 3 require a high concentration of methane in the gas mixture. The surface wells would be able to supply such gas, but not in sufficient quantities;
- The CMM from the underground degasification galleries do not supply currently gas with a sufficient concentration (>35%). Only after degasification will be improved, planned in 2008/2009, stage 2 & 3 can be considered;
- Furthermore the management would like to see whether developing a JI project will lead to the actual generation of revenues in order to investment in larger scale projects.

Therefore only stage 1 is considered in this PDD. The other stages will be considered after stage 1 is implemented, JI revenues have been received and underground degasification has been changed.

The degasification activities at the mine are implemented *independently* from the JI project and do not interfere in methane extraction volumes to the surface.

The use of CMM will be provided through construction of two methane fuelled boilers[8]. Eleven surface wells will be supply CMM to boiler house through the Vacuum Pump Station. (There are five surface wells supply CMM at the moment.)

---

[7] The decision to implement JI project was made 07 /07/2005.Refer please to Supporting Document 02 part 1. Only Stage 1 is considered in this PDD Stage 2 and Stage 3 are only envisaged JI projects according to Mine's owner plans.

[8] Technical characteristics of new boilers http://www.sibpromenergo.ru/boiler/ke25-4-65-10-25.html

Heat utilization

Currently the heat supply of Sukhodilska-Skhidna Coal Mine is provided by three coal boilers In the course of putting into operation of the two methane fuelled boilers, the consumers of heat will receive the heat generated by those boilers. Two existing coal fuelled boilers will be decommissioned whereas one coal boiler will remain as spare boiler.

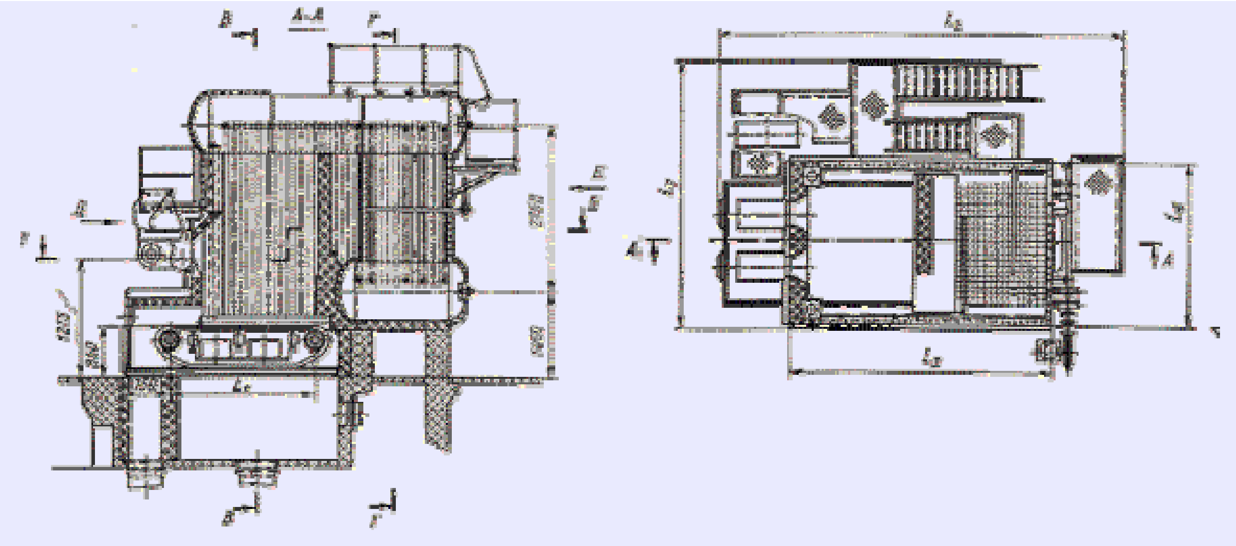

Figure 4: Steam boiler KE

Type of boiler	Fuel type	Steam Capacity t/h	Steam Pressure MPa (Kg/sm^2)	Steam Temperature ^oC	Efficiency on coal	Dimensions, mm			Weight, Kg
						Length	Width	Height	
KE-10-24C	Brown coal	10	2.4 (24)	220	82.5	8710	5235	5280	17410

Table 7: Technical characteristics of the boiler

The project has started after 1 January 2006. The table below shows the implementation of different stages of the project.

Activity	Date
Decision about JI project	7 July 2005
Designing period	July 2005-December 2005
Assembling and testing of the fist CMM fuelled boiler	January 2006-July 2006
Decommissioning of two coal fuelled boilers	June 2006
Formal commissioning of the first CMM fuelled boiler	7 August 7 2006
Commissioning of the second CMM fuelled boiler	March 2008

Table 8: Implementation of different stages of the project

Training programme

The staff of the mine's boiler house has received an extensive training programme for operating this project.

Maintenance programme[9]
The maintenance and operation of the project equipment has provided by the mine itself.

Risks of the project

The following risk could be identified:

Risk	Mitigation
Not enough CMM available for utilization	The amount of extracted CMM is higher than the amount of utilized CMM creating a buffer
Lower CMM demand	Since year 2006 the output of mined coal increased significantly
Lower concentration of methane in extracted gas	Utilizing more extracted gas.

Table 9: Risk and mitigation to the project

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 generation of heat with the methane fuelled boilers will lead to a destruction of CMM that otherwise would be vented into the atmosphere. The use of two CMM boilers fully covers the demand of the mine for thermal power.

The envisage project is not "business-as-usual" and faces several barriers, both in terms of prevailing practice and the economic attractiveness of the project. In section B of this PDD, it is shown that the emission reductions would not occur in absence of the project.

Of the different measures the emission reductions are achieved in the following ways:

No	Activity	Project	Baseline	Reduction
		tCO2	tCO2	tCO2
1	Combustion of methane in boilers	40 390	309 417	344 962
2	Replacement of coal fired boilers		75 935	

Table 10: Emission reductions

[9] The mine has it's own staff to provide maintenance of all heating equipment

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

	Years
Length of the crediting period before 1 January 2008	2
Year	Estimate of annual emission reductions in tones of CO_2 equ.
Year 2006	12 905
Year 2007	23 925
Total estimated emission reductions over the period before 1 January 2008 (tones of CO2 equ.)	36 830

Table 11: Estimated emission reduction before 1 January 2008

	Years
Length of the crediting period within 2008-2012	5
Year	Estimate of annual emission reductions in tones of CO_2 equ.
Year 2008	51 526
Year 2009	64 152
Year 2010	64 152
Year 2011	64 152
Year 2012	64 152
Total estimated emission reductions over the crediting period (tones of CO2 equ.) within 2008 - 2012	308 132
Annual average over estimated emission reductions over the crediting period within 2008-2012 (tones of CO2 equ.)	61 626

Table 12: Estimated amount of emission reductions over the crediting period 2008-2012

Year	Estimate of annual emission reductions in tones of CO_2 equ.
Year 2013	64 152
Year 2014	64 152
Year 2015	64 152
Year 2016	64 152
Year 2017	64 152
Year 2018	64 152
Year 2019	64 152
Year 2020	64 152
Total estimated emission reductions over the period (tones of CO2 equ.) within 2013 - 2020	513 216

Table 13: Estimated amount of emission reductions generated after the crediting period 2013-2020

A.5. Project approval by the Parties involved:

The project has been endorsed by Ukraine. The endorsement was issued by the Minister of Environmental protection in the Letter of Endorsement dated 20th of February 2007 with reference number № 1691/10/3-10. The approval of the project by the host party Ukraine and the investor party the Kingdom of the Netherlands, is expected after completion of the determination process.

A conclusion of a Memorandum of Understanding between the Dutch and the Ukrainian Governments is signed.

SECTION B. Baseline

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

The approved consolidated methodology ACM0008 / Version 03*"Consolidated baseline methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring")* has been used to identify the baseline scenario of the proposed JI project.

Applicability of ACM0008
The project involves the utilization of pre-mining CMM through surface wells only. This extraction activity is listed as one of the applicable project activity. The methane is captured and destroyed through utilisation to produce thermal energy.

Ex-ante projections have been made for projections of methane demand based on projections of thermal energy demand of the mine. The expected thermal demand is listed in annex 2. The CMM is captured through existing mining activities. The following does apply to the Sukhodilska-Skhidna mine:

- The mine is not an open cast mine;
- The mine is not an abandoned/decommissioned coal mine[10];
- There is no capture of virgin coal-bed methane;
- There is no usage of CO_2 or any other fluid/gas to enhance CDM drainage.

In step 1 below the method of extraction is described in more detail.

Hence ACM0008 is fully applicable to this JI project.[11]

Step 1. Identify technically feasible options for capturing and/or using CBM/CMM

Step 1a. Options for CBM and CMM extraction
In accordance with the ACM0008 methodology, all technically feasible options to extract CMM have to be listed.

CBM is not considered as in the Donbass the coal seams if a very low permeability. Therefore it is not possible to extract CBM before strata is de-stressed due to mining of the coal unless applying special measure to enhance CBM drainage. This is confirmed by the following statement. *"It is necessary to note that in pas decades, due to low permeability of loaded coal seams (2-3 degrees less than permeability of manifolds of traditional gas fields), and presence of methane in seams with close sorption connection with coal media, mainly in form of the solid coal and gas solution, basic studies for issue of preliminary extraction of methane from coal carrying strata were directed to substantiation and development of prospective methods of artificial increase of gas recovery of coal seams based on application of proper energy intensive technical influences to massif or coal seam [1,2]"*[12]

In the case of Sukhodilska-Skhidna mine there are three steps implemented to extract CMM, being:
1. CMM extraction through surface wells;
2. CMM extraction through underground boreholes or drainage galleries;
3. CMM extraction through ventilation.

---

[10] Two of the surface wells are above coal seams that were mined before the year 2000. However the methane coming from both surface wells originate from the mining of the adjacent coal seam which is being mined 2007/2008. More detailed information has been submitted to the AIE.

[11] http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

[12] Source: "Analysis of geomechanical processes in coal carrying strata by prior extraction of coal mine methane", National Academy of Science of Ukraine, Methane of Ukraine, edition 17, 2000.

Pre-mining CMM through surface wells
The first step is done by drilling bore holes from the surface to the coal seams that will be mined. Due to the high pressure, CMM will vent into the atmosphere automatically. To enhance the extraction of CMM pumps are used. Due to the low permeability of the Donbass coal seams as argued above, the CMM will only be released just before (or during) the mining. Due to the mining activities the strata is de-stressed and factured and CMM is released. As the release takes place just before the mining takes place, the CMM is classified as pre-mining CMM. CMM extracted through surface wells has a concentration of methane in the air mixture in the range of 50 – 90%. The amount of CMM released by the surface wells is sufficient for supplying the heat demand of the mine.

Pre-mining CMM through underground boreholes/drainage galleries
The second step in the extraction process is degasification activities through underground drainage galleries. From the mining area horizontal pipes are drilled into the coal seam that will be mined. The pipes are connected to vacuum pumps on the surface and CMM is sucked from the coal seam after which mining can take place. As the release takes place just before the mining takes place, the CMM is classified as pre-mining CMM.

Post-mining CMM as Ventilation Air Methane (VAM)
Any remaining CMM is removed from the mine through the third and last step in the process. This is the ventilation of the mine by blowing air through powerful ventilators. This CMM is classified as post-CMM.

All three extraction activities are done for safety reasons only and are therefore not included in the project boundary. This activity will therefore be implemented irrespective of the JI project. Hence the three step CMM extraction will be identical to both the baseline and project scenario.

Step 1b. Options for CMM treatment
The following technical options exist to treat the captured CMM from the surface wells at Sukhodilska-Skhidna mine:
i. Venting into the atmosphere (current situation);
ii. Using/destroying ventilation air methane rather than venting it;
iii. Flaring of CMM;
iv. Using methane for additional captive power generation;
v. Using methane for additional heat generation (proposed project activity not implemented as JI);
vi. Possible combination of options i to v.

The following options are not technically feasible to use the extract CMM:

Using/destroying ventilation air methane
Due to the low concentration of methane in the ventilation air, VAM can only be utilized using very special equipment, e.g. Voxidizers. However, the technology to utilize VAM has not been developed yet on a wide commercial scale. Throughout the PDD ventilation air methane, like methane coming from the underground degassing system, will not be considered for utilization purposes.

Use for additional grid power generation
The mine is quite far located from the electricity grid (Luhanskenergo). To transport the additional power to the grid would require a significant investment. The current overhead lines from the grid to the mine do not have the capacity to transport the to-be generated electricity.

Feed into gas pipeline
There is no nearby natural gas piping infrastructure where the gas can be transported to. Therefore this option would require a significant investment and was therefore not considered.

Some of the options were developed as possible alternatives for the baseline scenario. In step 3 of this section some of these options will be further developed into baseline scenario alternatives. The generation of own heat energy is the required output for this project.

Step 1c: Options for energy production
The mine has two energy needs, namely electricity and heat. Electricity is used for operating equipment, elevators, ventilators and vacuum pumps. Heat is needed for heating of the mine and office buildings. The mine has the following options for energy productions:

- Take electricity from the grid of Luhanskenergo (current situation);
- Produce captive electricity using natural gas;
- Produce captive electricity using extracted CMM;
- Generate heat on-site using coal (current situation);
- Generate heat on-site using natural gas;
- Generate heat on-site using extracted CMM (proposed project activity not implemented as JI).

Step 2. Eliminate baseline options that do not comply with legal or regulatory requirements
According to the national safety regulations, the coal mine methane has to be extracted. There is no regulation in place that would require any specific *utilization* of the extracted methane. On the other hand, there is no national regulation in place that would prohibit the use of CMM for heat and/or electricity generation. Therefore, all the alternatives listed in step 1b and step 1c are in compliance with the existing regulations.

Step 3. Formulation of the baseline scenario alternatives
The following alternatives can be considered for implementation at the Sukhodilska-Skhidna mine and these alternatives are in compliance with the options as listed in step 1b and step 1c. For all possible alternatives the mine has to extract the CMM from the mine for safety reasons. Therefore the alternatives below assume extraction as described in step 1a and describe in detail the alternatives for treatment and utilization.

For energy generation purpose the mine can use natural gas, coal or CMM as fuel. When comparing natural gas and coal, the price of coal is lower than the price of natural gas. Furthermore there is currently no infrastructure to transport the gas to the mine. Therefore in the alternatives below, if no CMM will be utilized, the alternative fuel will be coal only.

Both of the two pre-mining CMM (surface wells and underground galleries) can be utilized. CMM extracted through underground boreholes or drainage galleries has a concentration of methane ranges from 20 to 35%. Should the concentration go below 30% there could be a risk of explosions of the CMM in the boiler. This creates additional technological challenges, whereas CMM from surface wells is abundantly available. Therefore, only utilization of CMM for surface wells was considered by the mine at this stage (see remarks in section A.4.2).

Utilization of CMM from surface wells is considered in the following alternatives.

Alternative 1: Venting of CMM
Since there are no legal requirements for treatment and utilization of the captured CMM, it is common practice at Ukrainian coal mines to vent the CMM into the atmosphere. This alternative entails a continuation of the practise before project implementation and that is to vent all CMM into the atmosphere. The CMM coming from the surface goaf wells is vented passively through goaf wells due to the pressure of the CMM.

The energy needs of the mine will, under this scenario, continue to be supplied in the following way:

- Electricity will be taken from the grid (current situation);

- On-site heat demands will be supplied by the existing on-site boilers which are coal fired (current situation)

Alternative 2: Flaring of CMM
CMM captured at the Sukhodilska-Skhidna mine can be flared in torches supplied by the wells. The flares would be fuelled by the CMM coming from the surface well (Previously the mine experimented with an experimental flaring system. However this flaring installation was never in operation and was abandoned and demolished.)

The electricity and heat needs of the mine will be supplied in the same way as described in alternative 1.

Alternative 3: Using CMM for on-site heat generation
CMM captured at the mine can be utilized for on-site heat generation. Under this alternative the existing boilers would have to be reconstructed or replaced in order to be able to combust CMM. This would mean that either the burner will be replaced or a complete new boiler system will have to be installed.

The heat needs of the mine can be fully covered under this alternative whereas the electricity needs will continue to be supplied by the electricity grid.

Alternative 4: Using CMM for additional captive electricity
The concentration of CMM captured from the surface wells has a relatively high concentration of methane and can be used for the production of electricity. Under this alternative few small cogeneration modules will be installed to produce electricity only. In addition a gas treatment facility and control system will be needed to clean the CMM and to assure that CMM is supplied in the right concentration.

Electricity produced by the installation will be used for own consumption needs and the surplus will be supplied to the national electricity grid. The heating needs of the mine will continue to be supplied by the coal fuelled boilers.

Alternative 5: Using CMM for additional captive electricity and heat generation
The concentration of CMM captured from the surface wells has a relatively high concentration of methane and can be used for the combined production of electricity and heat. Under this alternative few small cogeneration modules will be installed to produce electricity and heat. In addition a gas treatment facility and control system will be needed to clean the CMM and to assure that CMM is supplied in the right concentration.

Electricity produced by the installation will be used for own consumption needs and the surplus will be supplied to the national electricity grid. The generated heat will be used for on-site needs to replace existing boilers.

Step 4. Elimination of the baseline scenario alternatives that face prohibitive barriers

In this section the possible alternatives formulated above will be checked against the existing economic and other barriers for their implementation. Non-realistic alternatives will be eliminated. The following set of barriers could be identified:

Investment barriers
- No revenue barrier: A baseline alternative does not generate any revenues. This could be the case for alternatives that include flaring (not registered as a JI project);
- Not financially attractive barrier: A baseline alternative could have a very low return on investment (not a financial attractive course of action).

Technological barriers

- Safety barrier: The concentration of CMM could drop below 30% causing explosive situations. Therefore special equipment is needed to prevent explosions;
- Infrastructure barrier: The mine is very remote and there is not sufficient infrastructure to transport electricity to the nearby grid or the transportation of CMM to the natural gas grid.

Barriers due to prevailing practice

- The project is 'first of its kind'. The Project Owner could not find any similar type of projects in Ukraine, not being developed as a JI project. Those similar projects of which the Project Owner is aware are developed as JI project. A list of JI projects under development is given in section B.2, step 4.
- Common fuel type is fossil fuel: Coal (or natural gas) is a tested fuel for the generation of energy. Also prices are still relatively low, in particular for the mine as coal is delivered by other subsidiary mines of Krasnodonvuhillya. As a consequence the prevailing practice is still to generate heat through fossil-fuelled boilers and take the electricity from the grid.

Whether any of the developed alternatives faces any of the barriers mentioned above, is described below.

Alternative 1: Venting of CMM
There are no legal requirements that prohibit venting or require mines to utilize CMM. This alternative represents the situation in the absence of the proposed JI activity. This alternative does not face any of the barriers mentioned below as no additional investment is required, no technology has to be implemented for venting and venting of CMM is prevailing practise in Ukraine. Therefore, this scenario can be considered to be a realistic alternative.

Alternative 2: Flaring of CMM
Flaring of the CMM is not required by the existing national regulation. Additional investment has to be made by the project owners to install torches that will be used for flaring. Taking into account that additional revenue from JI mechanism is not taken into account at this point, this scenario shall not be considered as realistic. It faces a prohibitive investment barrier as the investment will not generate any revenues (no revenue barrier). Furthermore this alternative would not generate heat, which is a requirement of the mine for the development of any utilization project.

Alternative 3: Using methane for on-site heat generation
CMM can be used for heat generation that can be consumed on-site. This alternative represents the proposed JI project without the JI incentive. As is shown in section B.2 the project scenario is financially not attractive (not financially attractive barrier).

Alternative 4: Using CMM for additional captive electricity
CMM can be used for captive electricity generation. The investment sum would be considerable higher than under the proposed project activity. This kind of project faces 'first of its kind' barrier as no other projects are using CMM for electricity generation except for the project JI0035 at the Mine named after A.F. Zasyadko which is developed as a JI project. Furthermore the prevailing practise is to generate heat using fossil fuel (common fuel type barrier).

Alternative 5: Using methane for on-site electricity and heat generation
CMM can be used for on-site electricity and heat generation. This would entail the purchase of cogeneration equipment plus a CMM treatment facility to ensure the right quality and concentration of the air mixture fed to the cogeneration units. It also requires to build the infrastructure to bring the produced electricity to the on-site power consumers and the regional grid. The amount of required CMM will have to be increased to allow for the same heat production. This might require to include CMM from the vacuum pumps as well. This alternative is more complex than alternative 3. It faces the same barriers as mentioned under alternative 3 and 4 (First of its kind, common fuel type barrier and not financially attractive).

Conclusion
There is only one realistic option for the baseline scenario which is a continuation of the existing situation which is to vent CMM from the surface wells into the atmosphere and generate heat with the existing coal-fired boilers. This alternative is therefore the baseline scenario of this project

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:

In accordance with the chosen methodology, additionality has to be proven by applying the "Tool for demonstration and assessment of additionality (version 03)[13]".

The management of the mines considered to implement this JI project at several occasion. On 7 July 2005 a decision was made to implement this JI project at Sukhodilska-Skhidna Mine. Only after the Ukrainian government adopted the procedure to endorse and approved JI projects, the process to develop the necessary documentation (PIN, PDD) was started.

Step 1. Alternatives
In accordance with the methodology ACM0008, this step is ignored.

Step 2. Investment analysis

Sub-step 2a. Determination of the analysis method

The proposed JI project will generate additional savings on heat cost as there will be no necessity to purchase coal for heat generation.

The mine did not compare different investment alternatives to generate the required heat as only two alternatives remained (see section B.1.) which are the continuation of the existing situation (no investment required) and the proposed JI activity. Therefore the investment comparison analysis (Option II) cannot be performed for the identified alternatives. Therefore the benchmark analysis (Option III) will be used to test the additionality of the proposed JI activity.

Sub-step 2b. Application of the benchmark analysis

The core business of the Sukhodilska-Skhidna mine is to mine coal for the Ukrainian and international market. The project would secure heat supply at the site. Nevertheless such an investment draws operating capital away from the mine core business, which is the mining of coal and ensure the safety of the miners. Due to the increasing demand in coal on the Ukrainian market, the mine has increased the coal production from 500,000 tonne in 2004 to 1,000,000 tonne in 2006. The mine plans to increase the production significantly in the coming years. This will require significant amount of operating capital.

The mine has not formalized an internal benchmark for investment project therefore and internal company IRR approach can not be used (option 4c in CDM Additionality Tool version 3).

[13] Source: cdm.unfccc.int

As soon as the company has not passed IPO, i.e. its shares have no market price. Thus the Weighted Average Cost of Capital (WACC) method can not be used for company's discount rate calculation that is often used as minimum IRR benchmark. Therefore option 4b of CDM Additionality Tool Version 3 is not applicable for this case. Thus the most applicable is the "accumulated method" of calculations (i.e. option 4a). This method calculates IRR benchmark as sum of without risk factor and risk factor. One of the most relevant without risk factors in line with recommendations of the mentioned above documents is long term state bonds yield. Ukraine regularly issues state bonds for covering internal state debt. For internal political reasons the bonds were not issued from July 2005 till September 2006. In September 2006 the trial auction took place for 2 and 3 year bonds with proposed 9.4% yield.[14] Bearing in mind that 3 year bonds are not long term bonds (the papers with longer payment period should have higher % to be attractive for investment) and their unattractiveness (low value of yield proposed) the without risk rate of 9.4% considered here looks more than conservative.

When using "accumulated method" the risk factor may be identified on the basis of expert opinion in case of lack of the data for the similar projects in the country. The information on similar projects in Ukraine did not exist at the moment of project activities start (January 1st, 2006) as the described project was completely new at that time. The only similar project is in Zasyadko coal mine where project implementation started later. The most important thing is the choice of proper expert to rely upon.

The risk factor for this type of project in mining industry in Ukraine is applied by as at the level of 7%[15]. The Institute of Industrial Economy of Ukraine is one of the leading scientific organizations in the country located in Donetsk – the capital of mining industry of Ukraine. Therefore their research activity is focused on industries important for the region inclusive coal sector. As soon as leading Ukrainian regulations on economic efficiency in coal mining sector mentioned in the Article referred does not provide risk factors, the authors focus on the necessity of incorporating risk assessment into decision making process and propose to use risk factor estimations developed by the other scientists in the Ukrainian coal mines. We rely on this expert opinion of risk factor estimations specified in the article to be relevant for Ukrainian coal mines.

The risk factor is taken from the Section "Production" from the Table 1 of the Article from the line "New technology with monopolized resources" as the project on Sukhodilska coal mine introduces new technology for CMM methane capture in a coal extraction process. Methane captured is a linked resource and the coal used is not purchased at the free market but within the company Krasnodonvuhillya. The average 7% risk factor proposed in the Article was considered to be on the moderate safe side.

Thus summing up the without risk factor of 9.4% combined with a risk factor of 7% results in an IRR benchmark of 16.4%. This is s the bare *minimum* IRR for Krasnodonvuhillya acceptable for investment decision making for this type of projects.

Sub-step 2c. Calculation and comparison of the indicators

Project investment cost amounts to Euro 3.76 million. The economic indicators for the proposed project (alternative 3) without JI revenue has been calculated under the following assumptions:

- Degasification activities and vacuum pumps were excluded from the capital costs as they are not part of the project (the degasification activities would have to be implemented anyway irrespective of the JI project);
- The heat consumption is taken as average from the last 4 years;
- As operational costs are taken to be those costs that are additional to continuation of the existing coal-fired boilers;

[14] Minfin of Ukraine "investigated "the lending market. – Economitcheskie izvestia. 18.09.06

[15] V.E. Neyenburg,,Y.Z. Dratchuk, D Methodological approach to efficiency evaluation of coal industry innovation projects in risk situations, - Scientific Papers of DonNTU. Economics series. Issue 76, 2004.

- The operational savings is the avoided purchase of coal for burning in the boilers, reduction in labour cost;
- The coal is purchased by the mine from other mines owned by Krasnodonvuhillya but to be on the safe side the price established by the Government of Ukraine is used (higher then internal price).

The project cash flow has the following financial indicators:

IRR	0.2%
Pay back	Exceeding project life time

Table 14: Economic indicators of project

As clearly can been seen the project is not an attractive financial investment.

Sub-step 2d. Sensitivity analysis

A sensitivity analysis of the proposed project was made based on the market forecasts available at the moment of making the financial analysis of the proposed project. The financial analysis is sensitive to the amount of heat that is required which depends whether a winter is cold, average, or warm. The price for the purchase coal can be considered but we took into account state coal price that has upwards trend though it can be considered stable as is determined internally within Krasnodonvuhillya as the coal is delivered by another mine owned by Krasnodonvuhillya.

	Heat demand 20% up	Heat demand and coal price 20% up	Coal price doubled
IRR	2%	4%	8%
Pay back	Exceeding project lifetime	Exceeding project lifetime	Exceeding project lifetime

Table 15: Result of sensitivity analysis

Thus, even in the case of a change of the heat production (=consumption) and significant coal price fluctuations the IRR stays below the benchmark.

Step 3. Barrier analysis

Sub-step 3a. Barrier identification

The proposed JI activity faces the following barriers:

Barriers to prevailing practices
According to publicly available information[16] 41,981 million cubic meters of CMM were generated by Ukraine coal mines in 1999 with approximately 13 percent being extracted through degasification systems while the rest released into atmosphere through ventilation systems. Only four percent of CMM (79 mln. cubic meters) was utilized. The situation at the Sukhodilska-Skhidna Coal Mine is in line with the situation in Ukraine. No CMM has been utilized at the mine so far.

[16] Handbook "Coal mine methane in Ukraine: opportunities for production and investment in the Donetsk coal basin", U.S. Environment Protection Agency, 2001, pp. 1-3.

Existing legislation[17] is primary orientated on increasing safety of coal mine operations thus facilitating and enforcing development of degasification and ventilation systems at coal mines. Therefore current practices prevent the project from being implemented and clearly prevent the development of CMM utilization activities.

Technology barrier
Utilization of CMM with a concentration of 30% or more is technically possible. However, there always remains a risk of explosion if the methane concentration is getting too low. Therefore, both the management and local authorities will be focussed on safeguarding the safety of the working operating the CMM-fired boilers. As not mainly examples of successful boilers are available, the implementation proposed technology will be under significant scrutiny of the relevant authorities. This requires, among other, the training of the personnel for the correct operation of the boilers as trained workers are not available.

Financial barrier
The main priority of the mine is to increase the production of coal while maintaining and improving the safety for the mine workers. This means that of all potential investment projects, priority is given to those projects improving the degasification of the mine. The mine could decide to finance the project on the domestic financial market. However domestic financial market opportunities for project financing in Ukraine are virtually absent. A common practice for the commercial bank financing can be a loan for up to maximum 3 years at 18-24% interest rate in the national currency. This is confirmed by the following article about project financing: *"The Ukraine continues to pose some investment risks due to political, economic and legislative instability. To date, these risks have made strictly private, long term financing prohibitively expensive or impossible to obtain, leaving quasi-public multilateral financial institutions (such as the European Bank for Reconstruction and Development, the International Finance Corporation, etc.) as the principal sources for Ukrainian project financing."*[18] In absence of project financing, the project would have to be financed from the cash flow of the mine. This would channel money away from important investments like increasing the safety of the mine workers which is first priority of the mine.

Sub-step 3b. Influence of the barriers identified on the alternative baseline scenario

The only viable alternative to the proposed JI activity is continuation of the existing situation. Since this scenario does not require any additional investment or changes in the technology, it is not affected by the barriers described above. All other alternatives do face one or more of the presented barriers.

Step 4. Common practice analysis

Venting the captured CMM into the atmosphere is the common practice in the coal sector of Ukraine[19]. Many CMM utilization project are currently being developed. One study[20] lists four CMM utilization projects. All four projects are developed as JI projects and need therefore not to be considered. The UNFCCC website[21] lists two projects (as of 24 July 2007), but also these projects do not need to be taken into consideration at this step.

---

[17] Decree of the President of Ukraine as of 16th of January 2002 # 26/2002 "On urgent activities for improvement of work conditions and development of the state supervision at mining enterprises"; The Governmental Decree as of 6th of July 2002 # 939 "On Complex Programme of coal-beds degasification at coal mines".
[18] "Project Financing", Alexey V. DIDKOVSKIY, the Ukrainian Journal of Business Law, May 2003. http://www.shevdid.com/publication/ovd_031.pdf
[19] Handbook "Coal mine methane in Ukraine: opportunities for production and investment in the Donetsk coal basin", U.S. Environment Protection Agency, 2001, pp. 1-3.
[20] CMM Global Overview, chapter Ukraine, page 229. US EPA July 2006 together with Methane to Markets partnership programme
[21] http://ji.unfccc.int/JI_Projects/Verification/PDD

The project developer is not aware of projects of using the CMM for heat generation that have been *implemented* without the additional JI incentive. This is supported by a recent study which mentions: *"Numerous projects have been conceptualized for development in Ukraine, including several for which detailed business plans were developed. To date, however, none of those have come to fruition and only a small number are being actively considered."*[22]

The proposed activity is therefore not common practice.

All steps of the additionality tool have been satisfied and hence the project is additional.

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

Baseline emissions

Source	**Gas**		**Justification / Explanation**
Emissions of methane as a result of venting	CH_4	Included	The main emission source. The amount of methane to be released depends on the amount used of the boilers and the amount of CMM vented to atmosphere directly.
Emissions from destruction of methane in the baseline	CO_2	Excluded	There is neither flaring nor use for heat and power in the baseline scenario.
	CH_4	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.
	N_2O	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.
Captive power and/or heat	CO_2	Included	In the baseline scenario heat would be generated by on-site coal-fired heat boilers
	CH_4	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.
	N_2O	Excluded	Excluded for simplification. This is conservative and in accordance with ACM0008.

Table 16: Sources of emission in the baseline scenario

[22] CMM Global Overview, chapter Ukraine, page 229. US EPA July 2006 together with Methane to Markets partnership programme

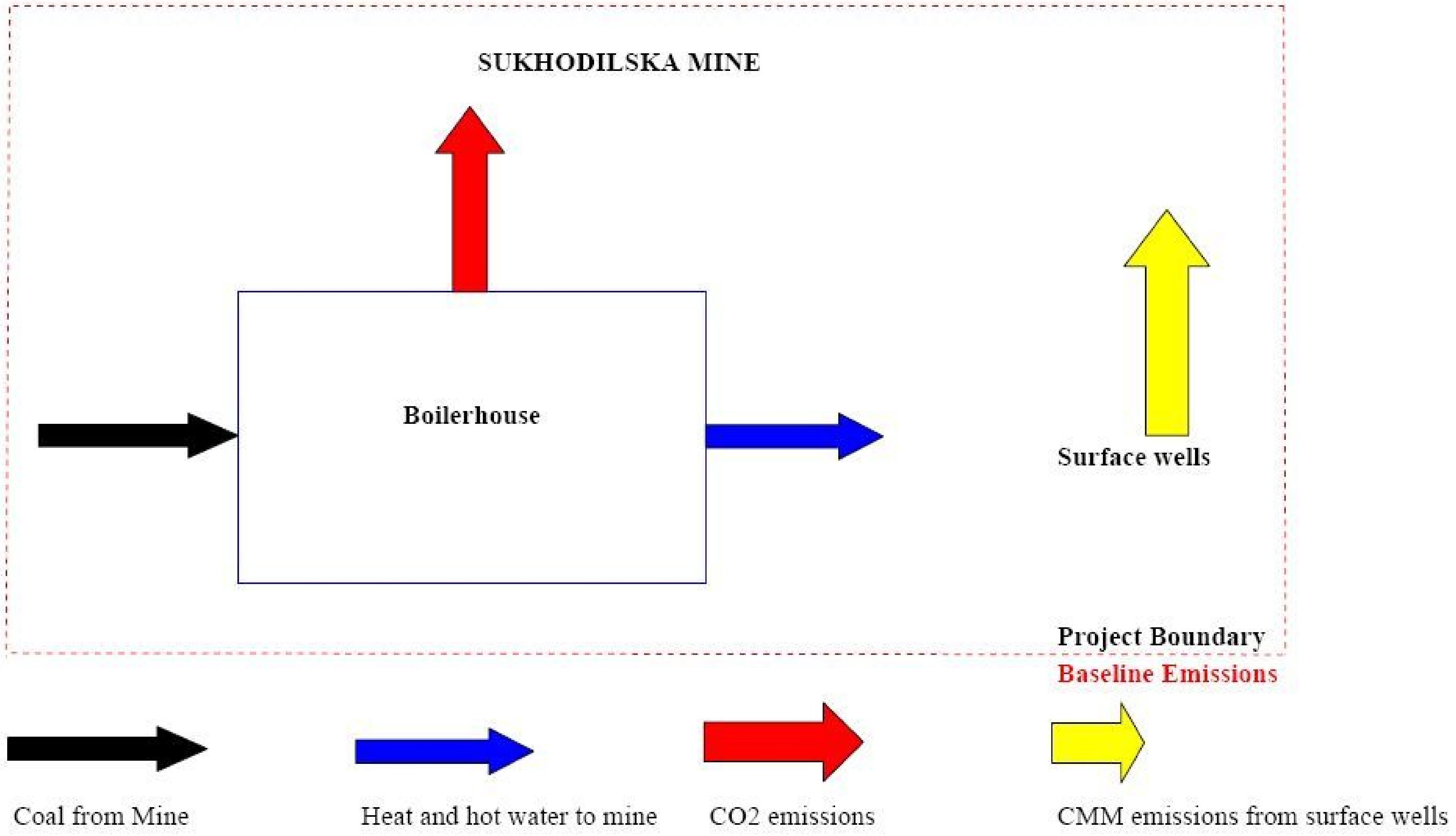

Figure 5: Baseline emissions.

Project activity

Source	**Gas**		**Justification / Explanation**
Emissions of methane as a result of continued venting	CH_4	Excluded	Only the change in CMM/CBM emissions release will be taken into account, by monitoring the methane used or destroyed by the project activity.
On-site fuel consumption due to the project activity, including transport of the gas	CO_2	Excluded	The own electricity consumption[23] of the boiler house stations is not significant[24] and has been excluded.
	CH_4	Excluded	Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small.
	N_2O	Excluded	Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small.
Emissions from methane destruction	CO_2	Included	From the combustion of methane in the CHP stations and for the vehicle use.
Emissions from NMHC destruction	CO_2	Included	NMHC accounts less than 1% by volume of extracted coal mine gas so has been excluded for estimating the emission reductions. However the NMHC percentage will be monitored on a regular basis and will be included if above 1%.
Fugitive emissions of unburned methane	CH_4	Included	The boilers will effectively burn 100% of all methane supplied. However in accordance with ACM0008 small amounts of un-combusted methane (0.5%) will be accounted for to remain conservative.
Fugitive methane emissions from on-site equipment	CH_4	Excluded	Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small.
Fugitive methane from gas supply pipeline or in relation to use in vehicles	CH_4	Excluded	Excluded for simplification in accordance with ACM0008.
Accidental methane release	CH_4	Excluded	Excluded for simplification in accordance with ACM0008. This emission source is assumed to be very small.

Table 17: Sources of emissions in the project scenario

[23] The capacity of equipment for new boilers are approximately the same that for boilers existed before project
[24] The average per year over the crediting period is less than 1% of the annual average and does not exceed the amount of 2,000 tCO2e. Reference JISC "Guidance on Criteria for Baseline Setting and Monitoring".

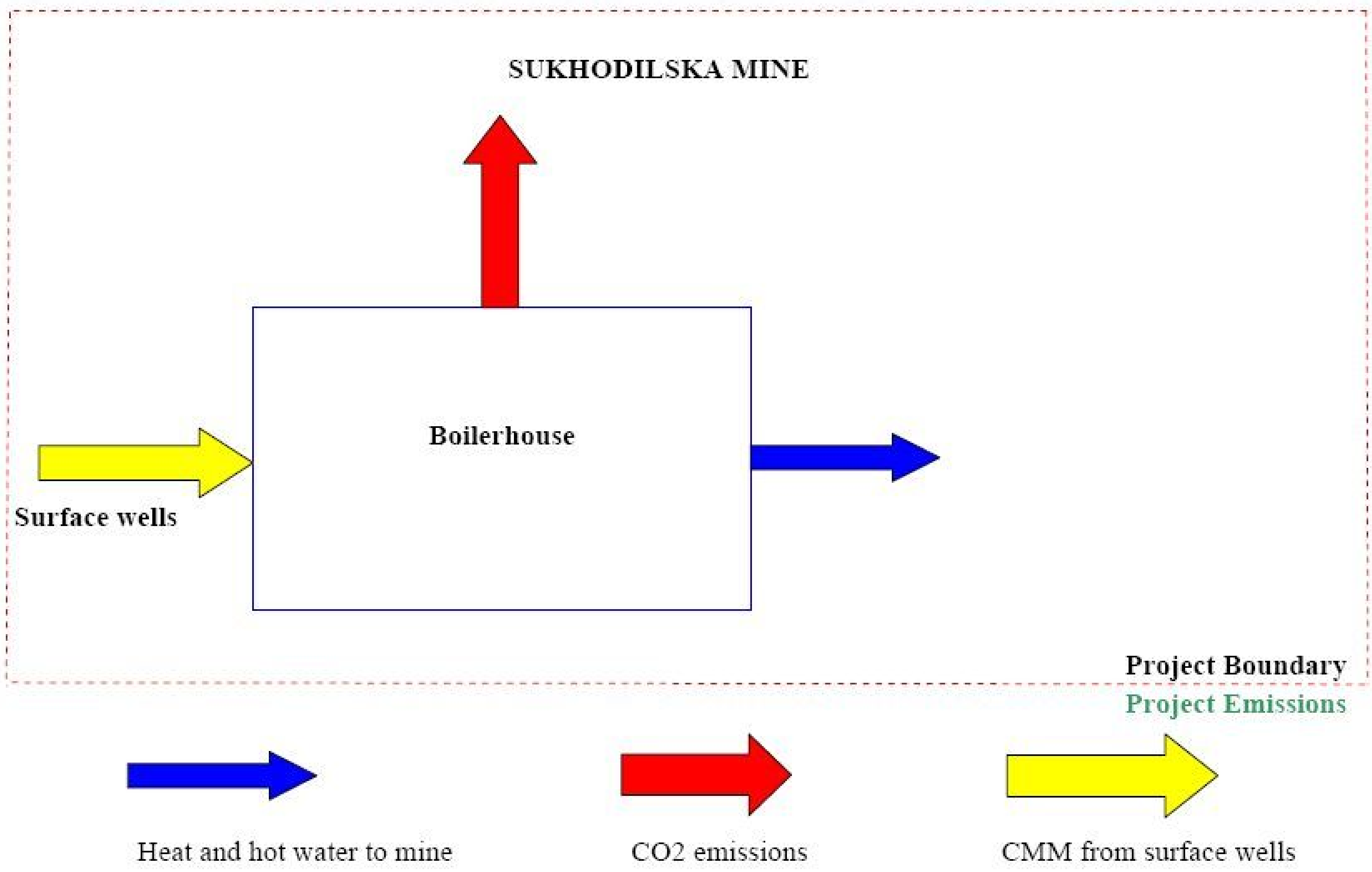

Figure 6: Project emissions

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

Date of completion of the baseline study: 12 February 2008.

Name of person/entity setting the baseline:

Global Carbon B.V.
Lennard de Klerk
Phone: +31 70 3142456
Fax: +31 70 8910791
E-mail: deklerk@global-carbon.com
Web: www.global-carbon.com

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

01 May 2006

C.2. Expected operational lifetime of the project:

No less than 20 years

C.3. Length of the crediting period:

Start of crediting period: 1 May 2006

Length of crediting period: From 1 October 2006 till 31 December 2012:

- For the period up to 31 December 2007 Early Credits will be claimed to be transferred through Article 18 of the Kyoto Protocol (IET);
- For the period 1 January 2008 till 31 December 2012 credits will be transferred through Article 6 of the Kyoto Protocol (JI).

Please note that the baseline setting and monitoring of Early Credits is identical with the baseline setting and monitoring of emission reduction that will be generated through the JI mechanism.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

ACM0008 (version 3) “Consolidated monitoring methodology for virgin coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring” has been used to set up the monitoring plan.

Applicability requirements for the monitoring plan of the ACM008 methodology are identical to respective requirements of the baseline setting. For a detailed overview of the ACM008 applicability please refer to section B.1 of this PDD.

The specific applicability requirements of the monitoring protocol related to flaring is not relevant as no methane is to be flared in the proposed JI project.

General remarks to the Monitoring Plan:

- In consultation with the verifier, the monitoring plan will be updated during the first verification;
- Social indicators such as number of people employed, safety record, training records, etc, will be available to the verifier;
- Environmental indicators such as dust emissions, NOx, or SOx will be available to the verifier. These indicators are being reported to the Department of Ecology of the Luhansk regional authorities on a monthly and annual basis;
- The CH_4 and N_2O emission reductions will not be claimed as mentioned in section B.3 and will therefore not be monitored. This is conservative and in accordance with ACM0008;
- All default factors have been taken from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

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
P1 PE_y	Project emission in year y	Monitoring of GHG emissions in year y	tCO_2e	c	yearly	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.2
P2 PE_{MD}	Project emissions from methane destroyed	Monitoring of GHG emissions in year y	tCO_2e	c	yearly	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.2

P3 PE_{UM}	Project emissions from un-combusted methane	Monitoring of GHG emissions in year y	tCO_2e	c	yearly	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.2
P5 CEF_{NMHC}	Carbon emission factor for combusted non methane hydrocarbons	Periodical analysis	$tCO_eeq/tNMHC$	m	annually	100%	Electronic and paper	
P6 r	Relative proportion of NMHC compared to methane	Periodical analysis		c	annually	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.2
P7 PC_{CH4}	Concentration (in mass) of methane in extracted gas	Periodical analysis	%	m	annually	100%	Electronic and paper	
P8 PC_{NMHC}	NMHC concentration (in mass) of extracted gas	Periodical analysis	%	m and c	annually	100%	Electronic and paper	Calculated if applicable, based on the lab analysis.
P9 MM_{HEAT}	Methane measured sent to the Boilers	Flow meters	tCH_4	m	continuously	100%	Electronic and paper	
P10 Eff_{Heat}	Methane combustion Efficiency (taken as 99.5% from IPCC)	IPCC	%	e	fixed	100%	Electronic and paper	IPCC default .Set at 99.5%
P11 MD_{HEAT}	Methane destroyed through heat generation (in the boiler house),	Flow meters	tCH4	c	yearly	100%	Electronic and paper	
P12 GWP_{CH4}	Global warming potential of methane	IPCC	tCO2e/tCH4	e	fixed	100%		IPCC default. Set at 21

Table 18: Data to be collected in the project scenario

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

Project emissions
The project emissions of the project are given by the following equation.

$$PE_y = PE_{ME} + PE_{MD} + PE_{UM} \quad (1)$$

Where:
PE_y Project emission in year y (tCO_2e)
PE_{ME} Project emissions from energy use to capture and use methane (tCO_2e)[25]
PE_{MD} Project emissions from methane destroyed (tCO_2e)
PE_{UM} Project emissions from un-combusted methane (tCO_2e)

The project emissions from methane destroyed
The project emissions from methane destroyed are given by the equation below. Methane will be destroyed in boilers. No flaring takes place so $MD_{FL} = 0$.

$$PE_{MD} = MD_{HEAT} x(CEF_{CH4} + rxCEF_{NMHC}) \quad (2)$$

with:

$$r = PC_{NMHC} / PC_{CH4} \quad (3)$$

where:
PE_{MD} Project emissions from CMM destroyed (tCO2 e)
MD_{HEAT} Methane destroyed through heat generation (in boiler house), (tCH4)
CEF_{CH4} Carbon emission factor for combusted methane (2.75 tCO2e/tCH4)
CEF_{NMHC} Carbon emission factor for combusted non methane hydrocarbons (the concentration varies and, therefore, to be obtained through periodical analysis of captured methane) (tCO_eeq/tNMHC)
r Relative proportion of NMHC compared to methane
PC_{CH4} Concentration (in mass) of methane in extracted gas (%) measured on a wet basis
PC_{NMHC} NMHC concentration (in mass) of extracted gas (%)

[25] Excluded because of the same amount in project and baseline scenario.

The relative proportion of NMHC is less than 1% and therefore has been excluded in the calculations. However, the NMHC content will be periodical analysed, and if significant, will be included in the project emissions. So:

$$PE_{MD} = MD_{HEAT} x CEF_{CH4} \quad (4)$$

Emissions of CMM boilers
The emissions of the CMM boilers are given by the following equation:

$$MD_{HEAT} = MM_{HEAT} x Eff_{HEAT} \quad (5)$$

where:
MD_{HEAT} Methane destroyed through heat generation (tCH4)
MM_{HEAT} Methane measured sent to heat plant (tCH4)
Eff_{Heat} Efficiency of methane destruction/oxidation in heat plant (taken as 99.5% from IPCC)

Emissions from un-combusted methane

$$PE_{UM} = GWP_{CH4} x MM_{HEAT} x(1 - Eff_{Heat}) \quad (6)$$

where:
PE_{UM} Project emissions from un-combusted methane (tCO2e)
GWP_{CH4} Global warming potential of methane (21 tCO2e/tCH4)
MM_{HEAT} Methane measured sent to heat plant (tCH4) MM_{HEAT}
Eff_{Heat} Efficiency of methane destruction in heat plant taken as 99.5% from IPCC).

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

B1 BE_y	Baseline emissions in year	Monitoring of GHG emissions in year y	tCO_2e	c	yearly	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.4
B2 $BE_{MR,y}$	Baseline emissions from release of methane into the atmosphere that is avoided by the project activity in year y	Monitoring of GHG emissions in year y	tCO_2e	c	yearly	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.4
B3 $BE_{Use,y}$	Baseline emissions from the production of heat, replaced by the project activity in year y	Monitoring of GHG emissions in year y	tCO_2e	c	yearly	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.4
B4 $CMM_{PJ,boilers,y}$	Pre-mining CMM captured, sent to and destroyed in the boilers in the project activity in year y	Flow meters	tCH_4	c	yearly	100%	Electronic and paper	This value is identical to MM_{CHP} in the project scenario
B5 $PB_{Use,y}$	Potential total baseline emissions from the production of heat, replaced by the project activity in year y	Monitoring of GHG emissions in year y	tCO_2	c	yearly	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.4
B6 $BE_{Use,heat.y}$	Total baseline emissions from the production of heat replaced by the project activity in year y	Monitoring of GHG emissions in year y	tCO_2	c	yearly	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.4

B7 EF_{heat}	Emissions factor for heat at the site in the baseline scenario	Combustion efficiency	tCO_2/GJ	c	fixed ex-ante	100%	Electronic and paper	See annex 2
B8 GWP_{CH4}	Global warming potential of methane	IPCC	tCO2e/tCH4	e	fixed	100%		IPCC default. Set at 21
B9 $HEAT_{cons,y}$	Heat consumed at the site delivered by the project activity in a year y	Flow meters	GJ	m	continuously	100%	Electronic and paper	Calculated using the formulae in Section D.1.1.4
B10 EF_{CO2}	Emissions factor for heat generation at existing boilers	Specifications of coal used	tCO_2/ GJ	c	fixed ex-ante	100%	Electronic and paper	See annex 2
B11 Eff_{heat_boiler}	Boiler efficiency of the heat generation at existing boilers	Boiler efficiency	%	c	fixed ex-ante	100%	Electronic and paper	See annex 2

Table 19: Data to be collected in the baseline scenario.

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

Baseline emissions

The baseline emissions are given by the following equation. There is no destruction of methane in the baseline scenario at the mine hence $BE_{MD,y} = 0$.

$$BE_y = BE_{MR,y} + BE_{Use,y} \quad (7)$$

Where:

BE_y Baseline emissions in year y (tCO2e)
$BE_{MR,y}$ Baseline emissions from release of methane into the atmosphere that is avoided by the project activity in year y (tCO2e)
$BE_{Use,y}$ Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity in year y (tCO2e)

Baseline emissions of methane avoided by project activity

As there is neither CBM nor CMM at the mine, the emissions equal the amount of pre-mining CMM captured in the project activity that is sent to the Boilers.

$$BE_{MR,y} = GWP_{CH4} x CMM_{PJ,CHP,y} \quad (8)$$

Where:

$CMM_{PJ,CHP,y}$ Pre-mining CMM captured, sent to and destroyed in the boilers in the project activity in year y (tCH_4)

GWP_{CH4} Global warming potential of methane (=21 tCO_2e/tCH_4)

Baseline emissions of replacement of heat by the project activity

As there is only pre-mining CMM involved the baseline emissions are given in the following equation.

$$BE_{Use,y} = BE_{Use,heat,y} \quad (9)$$

Where:

$BE_{Use,y}$ Potential total baseline emissions from the production of power, heat, and vehicle fuels replaced by the project activity in year y (tCO_2)

$BE_{Use,heat,y}$ Total baseline emissions from the production of heat replaced by the project activity in year y (tCO_2)

Baseline emissions of replacement of heat

Heat is being replaced on site. The baseline emissions are given in the following equation.

$$BE_{Use,Heat,y} = HEAT_{cons,y} x EF_{Heat} \quad (10)$$

where:

$HEAT_{cons,y}$ Heat consumed at the site delivered by the project activity in a year y (GJ)

$EF_{Heat,}$ Emissions factor for heat at the site in the baseline scenario (tCO_2/GJ)

On-site heat generation emission factors

The heat generation emission factor is fixed ex-ante by the following equation. As these existing boilers will be decommissioned no monitoring of emission factors will be possible. The specific value of emission factor is given in annex 2 and the CO_2 calculation sheet.

$$EF_{heat} = \frac{EF_{CO2}}{Eff_{heat\_boiler}} x \frac{44}{12} x \frac{1TJ}{1000GJ} \quad (11)$$

where:

EF_{heat}	Emissions factor for heat generation at existing boilers (tCO_2/ GJ)
EF_{CO2}	CO_2 emission factor of fuel used in heat generation at existing boilers (tC/TJ)
Eff_{heat_boiler}	Boiler efficiency of the heat generation at existing boilers (%)
44/12	Carbon to Carbon Dioxide conversion factor
1/1000	TJ to GJ conversion factor

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

Direct monitoring of emission in this case is not possible, hence Option 2 is not applicable for the project.

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 applicable

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

In accordance with ACM0008 the following leakages should be considered:

1. Displacement of baseline thermal energy uses;
2. CBM drainage from outside de de-stressed zone;

3. Impact of the JI project on coal production;
4. Impact of the JI project on coal prices;

There is no leakage in the project as:
1. There is no CMM being used for thermal demand under the baseline scenario. Hence there is no leakage for displacement of baseline thermal energy uses;
2. There is no CBM involved hence no leakage occurs from CDM drainage from outside the de-stressed zone;
3. There is no impact of the JI project on coal production as degasification activities are independent from the JI project;
4. The impact of the JI project on coal prices is difficult to assess. The JI project as such does not influence coal production so it is unlikely that the JI project will impact coal prices.

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

There is no leakage in the project

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

There is no leakage in the project

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):

The greenhouse gas emission reduction achieved by the project over a period is the difference between the total baseline emissions over the period , the total project emissions over the period and the leakage. In case of the proposed project leakage is zero. This is given by the equation:

$$ER_y = BE_y - PE_y \qquad (12)$$

where:

ER_y	Emissions reductions of the project activity during the year *y* (tCO_2e)
BE_y	Baseline emissions during the year *y* (tCO_2e)
PE_y	Project emissions during the year *y* (tCO_2e)

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:

To maintain a consistent and reliable performance of the automatic controlling and monitoring system an adequate quality control and assurance procedures that are regulated by the calibration standards and quality norms of national legislation will be implemented. Under requirements of quality control system, regular maintenance and testing regime to ensure accuracy of flow meters, gas-analyzers, and heat measuring instruments will be provided. All measuring instruments will be duly calibrated. The calibration protocols will be archived and proved by an independent entity on an annual basis. A consistency check for all measurement data and the calculation of the emission reductions will be carried out and reported every month.

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.
P5 CEF_{NMHC}	10%	The total quantity of NMHC content is quarterly measured in an external laboratory with special gas analyser equipment. The accuracy of the equipment is set fixed according to manufacturer data and calibration of the equipment will be done in accordance with the internal procedures of the laboratory.
P7 PC_{CH4}	2%	The concentration is measure on a continuous basis. For calibration procedures see section D.3.
P8 PC_{NMHC}	10%	See CEF_{NMHC}
P9 MM_{HEAT}	2%	The total quantity of methane sent to boilers is measured at boiler house. For calibration procedures see section D.3.
B6 $HEAT_{cons,y}$	2%	The amount of heat consumed on site will be measured by meters in boiler house. For calibration procedures see section D.3.

Table 20: Quality control and quality assurance.

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

The operational and management structure of the project is given in the figure below:

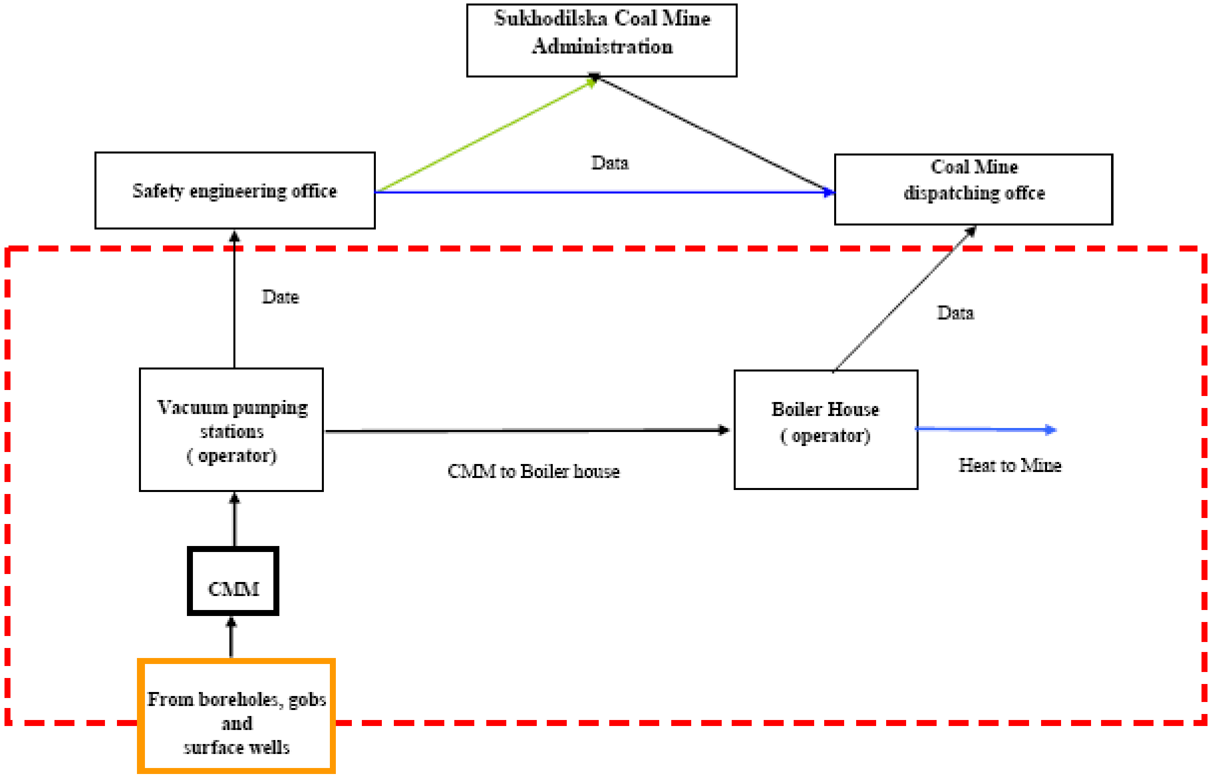

Figure 7: Monitoring and quality control system for Sukhodilska-Skhidna Coal Mine

The control and monitoring system can be divided into heat part and fuel gas part.[26]

[26] Detail information about control and monitoring equipment will be present during verification process.

Heat measurements[27]
The amount of generated heat is measured at Boiler House.

Measuring instrument	Work parameter	Uncertainty level of data	QA/QC procedures	Body responsible for calibration and certification
Orifice flow meter N1	Amount of steam generated at the Boiler 1	2%	Calibration interval of meters is 2 years.	Ukrainian Centre for Standardization and Metrology
Orifice flow meter N2	Amount of steam generated at the Boiler 2	2%	Calibration interval of meters is 2 years.	Ukrainian Centre for Standardization and Metrology

Table 21: Heat metering equipment

Heat generated by the boiler has to be calculated according to orifice flow meter data temperature, pressure and density of steam.

[27] There is no commercial system of control at the moment. Existed metering is accomplish by computer system only for heat produced in steam boilers but not heat supplied to mine's consumers

Measurement of CMM consumption[28]

CMM consumption of boilers

The cross-checking record of gas consumption is made at VPS that supply CMM to Boiler House. The total checking will be realized at place with the help of sensors for the pressure, temperature and flow and mobile concentration measurements device gas- analyzer ШИ-12

All source information on performance parameters will be stored at computer system of control.

All source information on performance parameters and calculations will be obtained directly on site and after that reported to the Coal Mine dispatching office. The work parameters of CMM flows as well as heat produced will be crosschecked to provide quality and reliability of monitored data.

Measuring instrument Flow meters	Work parameter	Uncertainty level of data	QA/QC procedures	Body responsible for calibration and certification
Volume of combustible methane consumed as fuel gas at boiler #1	Volume of combustible methane supplied to Boilers	2%	Calibration interval of meters is 2 years.	Ukrainian Centre for Standardization and Metrology
Volume of combustible methane consumed as fuel gas at boiler #2	Volume of combustible methane supplied to Boilers	2%	Calibration interval of meters is 2 years.	Ukrainian Centre for Standardization and Metrology

Table 22: Methane metering equipment

[28] It is necessary to install commercial metering for combustible methane. Existed in computer system flow meters are not commercial.

The follows parameters will be monitored to measure the amount of supplied methane (in nm^3):

#	Data	Unit	Method	Frequency of Measurement	Source	Responsible
1	Methane concentration	vol. %	Concentration measurement	Continuously	Gas-analyzer	Operator
2	CMM mix pressure	mbar	Pressure measurement	Continuously	Manometer	Operator
3	CMM mix temperature	°C	Temperature measurement	Continuously	Temperature sensors	Operator
4	Pure methane volume	nm^3	Calculation	Continuously		Operator

Table 23: Monitoring of parameters to determine the volume of CMM supplied

Emergency operations

In case of break down of CMM supply system (either of whole system or separate feeding pipe) methane-air mixture will be urgently released into atmosphere through the emergency gas vent stack. The shut-off valves will automatically close CMM supply pipes.

Employees' qualification

The employees responsible for the boilers work and for the monitoring control will be dully trained during installation of new CMM fuelled boilers.

Data storage and responsibilities

All operators are responsible for data administration. All relevant data will be summarized daily and archived electronically and in register records. All data will be stored at least five years long. Besides, operators prepare standardized daily, weekly, monthly and yearly reports.

Responsibilities

- Boilers operators control boilers work process parameters and heat output;

All the information will be channelled to the workstation of Coal Mine central dispatching office and on-line monitored by the head of the shift who will be responsible for calculation of CO_2 equivalent emission reduction. Such calculations will be implemented on monthly basis. The general supervision of the monitoring system will be executed by Sukhodilska-Skhidna Coal Mine administration under the existing control and reporting system.

Internal reviews and adjustment procedures

The general project management will be implemented by Chief Engineer of the Coal Mine through supervising and coordinating activities of his subordinates, such as deputy director on surface degasification, chief heating engineer, and heads of safety engineering departments. On-line information will be transmitted directly to the head of shift into the Coal Mine Central Dispatching Office. Three shifts by 8 hours will be introduced.

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

Global Carbon B.V.
Lennard de Klerk
Phone: +31 70 3142456
Fax: +31 70 8910791
E-mail: deklerk@global-carbon.com
Web: www.global-carbon.com

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

		2006	2007
Project emissions	[tCO2e/yr]	1 543	2 832
Total 2006 - 2007	[tCO2e]	4 375	

Table 24: Estimated project emissions before the start of crediting period.

		2008	2009	2010	2011	2012
Project emissions	[tCO2e/yr]	5 687	7 582	7 582	7 582	7 582
Total 2008 - 2012	[tCO2e]	36 015				

Table 25 :Estimated project emissions within the crediting period.

		2013	2014	2015	2016	2017	2018	2019	2020
Project emissions	[tCO2e/yr]	7 582	7 582	7 582	7 582	7 582	7 582	7 582	7 582
Total 2013 - 2020	[tCO2e]	60 656							

Table 26:Estimated project emissions generated after crediting period

E.2. Estimated leakage:

In case of the project activity no leakage is expected

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

		2006	2007
Project emissions	[tCO2e/yr]	1 543	2 832
Total 2006 - 2007	[tCO2e]	4 375	

Table 27: Project emissions before the start of crediting period.

		2008	2009	2010	2011	2012
Project emissions	[tCO2e/yr]	5 687	7 582	7 582	7 582	7 582
Total 2008 - 2012	[tCO2e]	36 015				

Table 28:Project emissions within the crediting period.

		2013	2014	2015	2016	2017	2018	2019	2020
Project emissions	[tCO2e/yr]	7 582	7 582	7 582	7 582	7 582	7 582	7 582	7 582
Total 2013 - 2020	[tCO2e]	60 656							

Table 29: Project emissions after the crediting period

E.4. Estimated baseline emissions:

		2006	2007
Baseline emissions	[tCO2e/yr]	14 448	26 757
Total 2006 - 2007	[tCO2e]	41205	

Table 30:Estimated baseline emissions before the start of crediting period.

		2008	2009	2010	2011	2012
Baseline emissions	[tCO2e/yr]	57 212	71 734	71 734	71 734	71 734
Total 2008 - 2012	[tCO2e]	344 148				

Table 31: Estimated baseline emissions within the crediting period.

		2013	2014	2015	2016	2017	2018	2019	2020
Project emissions	[tCO2e/yr]	71 734	71 734	71 734	71 734	71 734	71 734	71 734	71 734
Total 2013 - 2020	[tCO2e]	573 872							

Table 32: Estimated baseline emissions after the crediting period

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

		2006	2007
Emission reductions	[tCO2e/yr]	12 905	23 925
Total 2006-2007	**[tCO2e]**	**36830**	

Table 33: Estimated emission reductions before the start of crediting period.

		2008	2009	2010	2011	2012
Emission reductions	[tCO2e/yr]	51 526	64 152	64 152	64 152	64 152
Total 2008-2012	**[tCO2e]**	**308 132**				

Table 34:Estimated emission reduction within the crediting period.

		2013	2014	2015	2016	2017	2018	2019	2020
Emission reductions	[tCO2e/yr]	64 152	64 152	64 152	64 152	64 152	64 152	64 152	64 152
Total 2013-2020	**[tCO2e]**	**513 216**							

Table 35:Estimated emission reduction after the crediting period.

An overview of the emission reductions per measure can be found in section A.4.3.
Emission reductions generated in 2006 - 2007 will be transferred as AAUs in the frame of International Emissions Trading mechanism of the Kyoto Protocol. The emission reductions generated during 2008-2012 are to be transferred as ERUs in the frame of Joint Implementation mechanism of the Kyoto Protocol. The baseline setting and monitoring of reductions is done identical for the whole period, i.e. 2006-2012.

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

The result of the application of the formulae[29] above shall be indicated using the following tabular format.

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO_2 equivalent)
Year 2006	1 543		14 448	12 905
Year 2007	2 832		26 757	23 925
Total estimated over the period before 1 January 2008 (tones of CO2 equ.)	4 375		41 205	36 830

Table 36: Estimated emissions before crediting period

[29] For description of formulae refer please section D

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO_2 equivalent)
Year 2008	5 687		57 212	51 526
Year 2009	7 582		71 734	64 152
Year 2010	7 582		71 734	64 152
Year 2011	7 582		71 734	64 152
Year 2012	7 582		71 734	64 152
Total estimated emission reductions over the period 2008-2012	36 015		344 147	308 132
Total (tonnes of CO_2 equivalent) over the crediting period	40 390		385 352	344 962

Table 37: *Estimated emissions within crediting period.*

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO_2 equivalent)
Year 2013	7 582		71 734	65 005
Year 2014	7 582		71 734	65 005
Year 2015	7 582		71 734	65 005
Year 2016	7 582		71 734	65 005
Year 2017	7 582		71 734	65 005
Year 2018	7 582		71 734	65 005
Year 2019	7 582		71 734	65 005
Year 2020	7 582		71 734	65 005
Total estimated emission reductions over the period 2013-2020	60 656		573 872	513 216

Table 38:Estimated emission reductions over the period 2013-2020

Risks in estimation emission reductions:
While estimating the amount of emission reductions, some assumptions have been made. The following risks can be identified in the estimation:

- Amount of methane extracted. The exact amount of gas that will be extracted by the mine is difficult to determine precisely. However, the amount of methane utilized is lower that the expected amount that will be extracted. Therefore, even if the amount of extracted methane is lower, it will not reduce the amount of emission reductions;
- Amount of methane utilized. The amount of methane utilized depends on the working time of the boilers. Given the reliability of those boilers, it is not expected that the amount of working hours will be much lower.
- Heat delivered by the boilers to the mine. The amount of heat delivered depends on the heat needs of the Mine. Lower demand (e.g. due to mild winters) will reduce the heat needs and hence the amount the emission reductions.

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:

Project is totally adheres to existing norms, regulation and instructions, that among others include:
- Methods of estimation of the unorganized emissions of the gas-processing plants: RD 39-014306-413-88, 1988.
- Basic directions of the state policy of Ukraine in the sphere of the environmental protection, resource management and provision of the environmental safety. - Donetsk.: VAT "UkrNTEK", 1988.

Under existing environmental legislation Sukhodilska-Skhidna coal mine is obliged to monitor and report annually certain contaminant emissions (nitrogen dioxide, sulfurous anhydride, carbon oxide, dust etc.). Therefore there are already well established and fully functional procedures for environmental monitoring at the Sukhodilska-Skhidna coal mine. The office of environmental engineer is responsible for relevant data monitor, collection and compilation of quarterly reports. One a year report is submitted to Ministry of Environment Protection.

Environmental performance of the project will be monitored in the framework of existing procedures and data that will be collected will be incorporated into total environmental report that Sukhodilska-Skhidna coal mine prepares annually.

Environmental impact for air quality, water quality, noise, solid waste and zoology of the project activity has confirmation with local environmental authorities in Design Institute documentation.

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:

Please refer to section F.1.

SECTION G. Stakeholders' comments

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

There are no Stakeholder's comments at the moment.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organization:	JSC “Krasnodonvuhillya”
Street/P.O.Box:	5 Komsomolskaya street,94440
Building:	
City:	city of Krasnodon
State/Region:	
Postfix/ZIP:	
Country:	Ukraine
Telephone:	+38 06435 2 28 54
FAX:	+38 06435 27366
E-Mail:	dir.oao@ku.krasnodon.lg.ua
URL:	
Represented by:	General Director
Title:	
Salutation:	
Last Name:	Potapenko
Middle Name:	
First Name:	Alexandr
Department:	
Mobile tel:	
Direct FAX:	+38 06435 27366
Direct tel:	+38 06435 2 28 54
Personal E-Mail:	dir.oao@ku.krasnodon.lg.ua

Organization:	ING Bank
Street/P.O.Box:	Bijlmerplein 888
Building:	
City:	Amsterdam
State/Region:	
Postfix/ZIP:	1102
Country:	Netherlands
Telephone:	+31 20 6523579
FAX:	+31 20 5635164
E-Mail:	Peter.van.Eijndhoven@ingbank.com
URL:	www.ing.com
Represented by:	
Title:	
Salutation:	
Last Name:	Eijndhoven
Middle Name:	
First Name:	Peter
Department:	Green Finance
Mobile tel:	
Direct FAX:	+31 20 6523579
Direct tel:	+31 20 5635164
Personal E-Mail:	Peter.van.Eijndhoven@ingbank.com

Annex 2

BASELINE INFORMATION

The carbon factors have been calculated and fixed ex-ante for the coal-fired boilers using the formulae as described in section D of the PDD.

Boiler	**Fossil fuel**	**Efficiency [%]**	**$EF_{CO2,i}$ [tC/TJ]**	**EF_{heat} [tCO2/GJ]**
Boiler	Coal	85	24.8[30]	0.114

Table 39: Baseline carbon emission factors of on-site boilers

Year	**2003**	**2004**	**2005**	**2006**	**2007**
Heat consumption, GJ	**170 960**	**191 114**	**130 050**	**17 003**	**47 302**

Table 40: Historical data for heat consumption

Year	**2008**	**2009**	**2010**	**2011**	**2012[31]**
Heat demand, GJ	**127 465**	**127 465**	**127 465**	**127 465**	**127 465**

Table 41: Forecast for 2008--2012

[30] Based on a LHV of the coal of 29.409 GJ/t and a mass content of coal of 73.0%.

[31] 2007-2012 –forecast 7,6 GJ. 4000 hours.

Annex 3

MONITORING PLAN

Please refer to Section D and suppurate document "Monitoring Report".

Figure 8: CMM concentration measurement registry in boiler house.

Figure 9: Boiler's operation scheme

Figure 10:Boiler's automatic equipment control panel

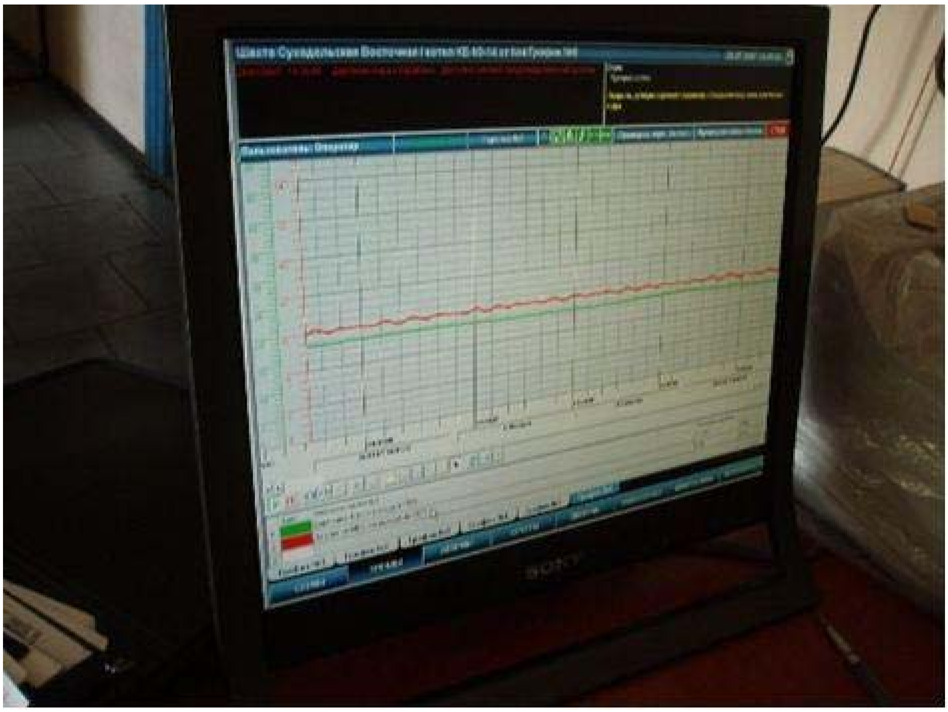

Figure 11: Software monitoring system