JOINT IMPLEMENTATION PROJECT

«Coal Mine Methane capture and utilization at Samsonivska-Zakhidna mine»

Position of the head of organization, company, entity being the developer of documents

Managing Director, GreenStream Network GmbH

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Krasnodon, May 2010

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

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SECTION A. General description of the project

A.1. Title of the project:

COAL MINE METHANE CAPTURE AND UTILIZATION AT SAMSONIVSKA-ZAKHIDNA MINE

The project falls under the sectoral scopes: (8) Mining/mineral production, and (10) Fugitive emissions from fuels (solid, oil and gas).

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A.2. Description of the project:

Coal mining is accompanied by release of methane which is held in coal beds and surrounding rocks. Methane is a natural gas by origin; also it is a by-product of coal and gas deposits exploitation. Coal Mine Methane (CMM) is a result of organic remains transformation under a high pressure and temperature. CMM belongs to a group of greenhouse gases under the Kyoto Protocol; its Global Warming Potential (GWP) is 21 times higher than GWP of a carbon dioxide

At productive coal mines CMM has to be vented from mines according to safety regulations. Currently there are a few methods of methane recovery from coal beds.

Underground coal mine Samsonivska-Zakhidna was built and is currently operating in a way that methane is released to a mine working space when coal is mined; methane is removed from the mine through powerful ventilators which are part of safety system, and also through the degassing system.

Ventilators are capturing methane which is releasing to mine working areas and then emitting the gas trough drainage wells.

Degassing system, which consists of a network of mine degassing conduits and vacuum pumping station located on the surface, removes methane from coal beds and surrounding rocks.

In the baseline scenario it is assumed that all the methane collected by the degassing system of the Samsonivska-Zakhidna mine will be released into the atmosphere. No measures aimed at the utilization of the degassing system CMM will be taken; therefore the existing situation in the absence of project activity will be continued. For the detailed analysis of baseline scenario please refer to the Section B of this PDD.

The main goal of this project is the utilization of CMM that has been captured by degassing system. CMM captured at Samsonivska-Zakhidna mine will be used for: (I) generation of electricity for the onsite consumption, (II) substitution of coal, which is currently used as a fuel for existing boilers; (III) flaring.

Thus, CMM utilization project implementation will result in a rise of profitability of the mine through electricity and heat generation, the risk of methane explosion will be decreased, and reduction of greenhouse gas emissions to the atmosphere will be achieved.

The first steps towards the project preparation were taken by Samsonivska-Zakhidna in 2004, when the mine ordered a feasibility study for switching the existing boilers from coal to CMM. In 2008 CJSC "Kotloenergoproekt" prepared feasibility study regarding the possibility of CMM utilization for power production by using methane as fuel for gas engines. The testing phase of the first KGUU-5/8 flare started in April 2009. The owners of Samsonivska-Zakhidna mine are to take final decision regarding investing into the

proposed project based on the results of the testing phase of the first KGUU-5/8 unit and the availability of additional financing from the JI mechanism.

A.3. Project participants:

Party involved	Legal entity project participants (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (host)	OJSC Krasnodonvugillya	No
The Netherlands	ING Bank N.V.	No
Germany	GreenStream Network GmbH	No

Table 1: Project participants

1) Open Joint Stock Company Krasnodonvugillya

Coal mining at the Krasnodon region, which is located in the eastern part of Donets Basin, is operated by OJSC Krasnodonvugillya. OJSC Krasnodonvugillya operates seven coal mines which are united into three mine management branches, namely: Molodogvardeyskaya, Orekhivska, Duvanna, Barakova, "50 years of USSR", Sukhodolska-Skhidna and Samsonivska-Zakhidna, two coal-preparation plants, subsidiary production plants. Total production capacity of the mines is 4830 kt of coal per year. Currently, the mining operations are carried out at depths of 400-900 meters. Average coal mining depth is 704 meters.

2) ING Bank N.V.

The Emissions Products team within ING Wholesale Banking focuses on projects that reduce greenhouse gas emissions under the rules of the United Nations' Kyoto Protocol on climate change. Based in Amsterdam and Shanghai, the team assists companies to identify Joint Implementation (JI) or Clean Development Mechanism (CDM) projects to reduce emissions and generate emissions reduction units, commonly referred to as 'carbon credits'. The team uses ING's international network and client relationships to identify and develop the projects, and then acts as intermediary in the sale of the resulting carbon credits to governments or to companies in schemes such as the EU Emissions Trading Scheme.

3) GreenStream Network

GreenStream Network (GSN) is a group of companies with approximately 60 employees; offices are located in Germany, Finland, Latvia, Norway, Sweden, Estonia and China. Main offices are located in Finland (Helsinki) and Germany (Hamburg). GSN is offering advisory services, brokerage, financial and other services related to renewable energy, emissions trading, such as the EU ETS, and greenhouse gas offset projects, such as JI and CDM. GSN is a member of the IETA (International Emissions Trading Association), the RECS (Renewable Energy Certificate System) and a registered participant in the Paris-based exchange Powernext Carbon Exchange for EU allowances. GSN key personnel has a long experience in energy markets, emissions trading, green certificates, CDM/JI project development and advisory activities. GSN has participated, among others, in one of the first transatlantic CO2 trades, in the first EU emission allowance trade between Nordic companies, in the first JI and CDM projects developed by Nordic governments, in the establishment of some of the first energy companies in the Baltic States' liberalized energy markets and in numerous advisory assignments for energy and industrial enterprises

as well as public organizations. GSN has closely followed the key JI and CDM countries' climate policies and the developments of the carbon markets, e.g. through the IETA (activities in several working groups) and BALTREL cooperation (e.g. chairmanship of the Task Force on JI), the World Bank (cooperation on marketing the CDM-fund Community Development Carbon Fund to companies in Northern Europe) and NEFCO (cooperation on preparing documentation for and launching the JI-fund Testing Ground Facility to companies).

A.4. Technical description of the project:

A.4.1. Location of the project:

The project is located at Molodogvardiysk (Krasnodon district of Luhansk Oblast) in the eastern Ukraine.

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Figure 1: Location of the Luhansk Oblast on the map of Ukraine (Source: http://uk.wikipedia.org)

A.4.1.1. Host Party(ies):

Ukraine

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

Luhansk Oblast.

Luhansk Oblast is located in eastern Ukraine. Its territory is 26 517 km^2. The climate of Luhansk Oblast is mostly continental, so it is characterized by warm summers and comparatively cold winters with variable snow cover.

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

Molodogvardiysk, Luhansk Oblast

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

Samsonivska-Zakhidna coal mine, which hosts the CMM utilization project, is located near the town of Molodogvardiysk, Krasnodon district, Luhansk Oblast (see Figure 2). Geographical coordinates of Samsonivska-Zakhidna mine: Latitude: 48°38'18'', Longitude 39°58'28''.

Molodogvardiysk was founded as a village in 1954; in 1961 Molodogvardiysk received the status of a town. The main activity of the town's population has been coal mining (at Talovska, Orehivska, "50 years of USSR" mines). A coal enrichment plant had also been built in the town. The first processing unit of Molodogvardeyskaya mine became operational in 1971. In 2000 the population of Molodogvardiysk accounted for 28 900 people. Coal mines (OJSC Krasnodonvugillya) remain the main employer for the local population. The territory of the town is 2.88 km^2.

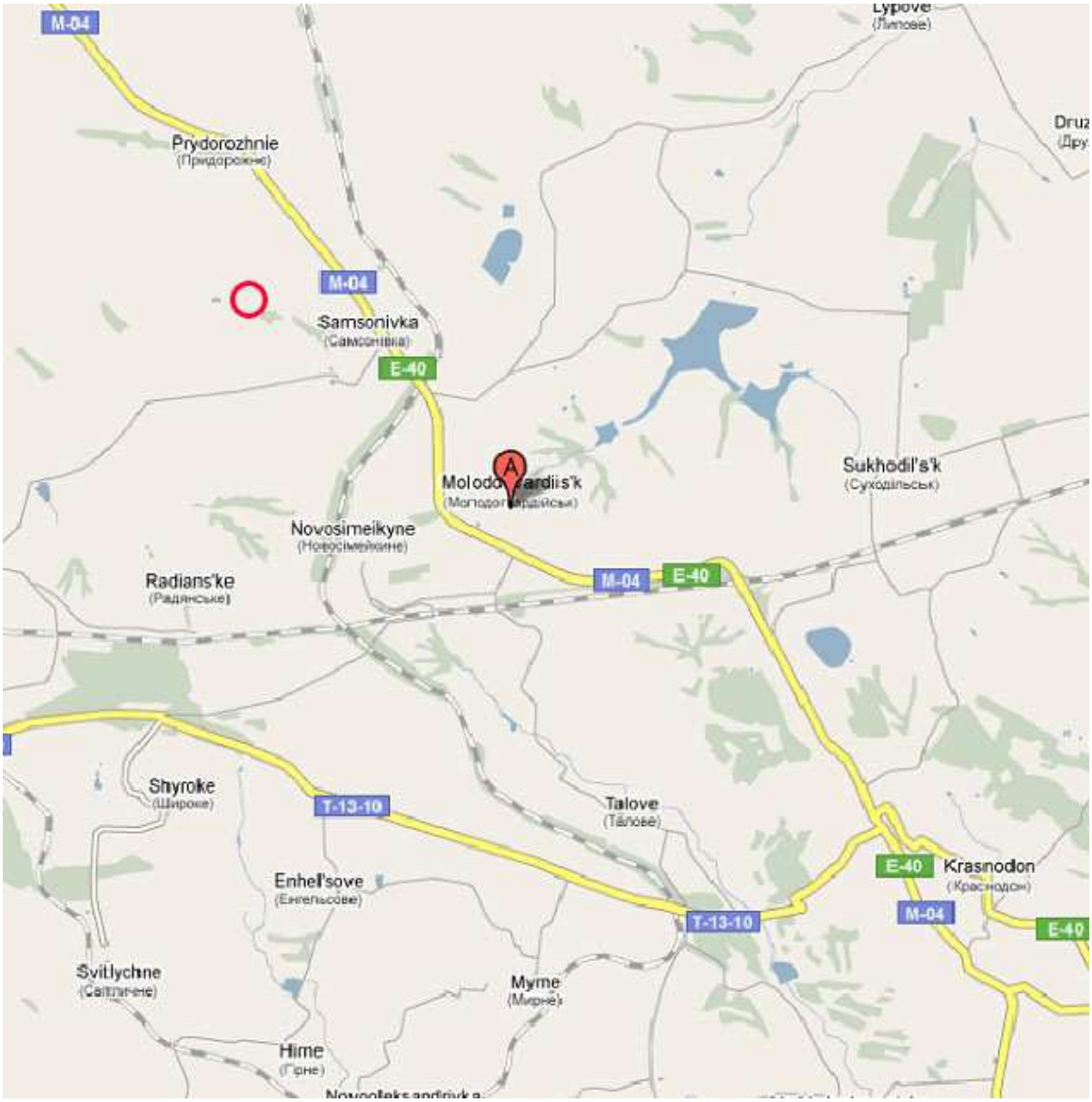

Figure 2: Location of Samsonivska-Zakhidna mine and Molodogvardiysk, Krasnodon district, Luhansk Oblast

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

Samsonivska-Zakhidna is an underground coal mine; its operation has started in 1999. As of 2007, 2967 people were employed at the mine. The current production capacity of Samsonivska-Zakhidna mine is 1 250 000 tons of coal per year. The mine covers the territory of 105.1599 hectares.

Balance reserves of Samsonivska-Zakhidna mine is 154 377 million tons of coal. Thickness of beds, which are being developed, is 1.25 meters. The type of the coal is “Zh” coking coal according to the Ukrainian coal

quality scale. Ash content of coal is 37.4. Sulfur content is 1.7%. The average content of methane in coal is 27 m^3/t of coal.

The primary means of coal mining in the mine is long coalfaces development. The current number of producing faces is three. A typical width of one coalface is 270 m. The number of shafts is 5: the main shaft (length - 960 m), auxiliary shaft №1 (857 m), intake shaft (1020 m), air shaft №2 (888 m). Coal beds are mined with long-pillars with increase method. The length of the drifts is 250-270 m.

It is known that one of the main sources of methane emissions to the atmosphere is coal mining. Methane, which is released into the atmosphere due to operation of Samsonivska-Zakhidna mine, has two main sources: ventilation methane and methane captured by degassing system. Due to extremely low concentrations of methane in the ventilation system, this component is not taken into account in the calculations.

The proposed project at the Samsonivska-Zakhidna mine consists of the following measures aimed at prevention of methane emissions and utilization of the CMM energy content:

1) Installation of three flaring systems for CMM combustion

A positive conclusion from the Donetsk Technical Expertise center regarding the use of KGUU-5/8 was received on April 22nd, 2008. This date is considered the date of the project activity start. The first KGUU-5/8 flare was installed onsite and started operation in the testing mode on April 1st, 2009. A temporary state permit has been issued for the testing operation of the KGUU-5/8 unit on September 14th, 2009. The other two KGUU-5/8 units are to be installed upon the successful testing phase.

2) Switching of existing coal boilers KE-10/14 and KVTS-20-150 to methane;

The management of the Samsonivska-Zakhidna mine has commissioned CJSC 'Kotloenergoproekt' for developing the technical design for the KE-10/14 boiler switch to CMM in 2004. At the time of the preparation of this PDD no decision has been made by the Samsonovska-Zakhidna mine regarding the implementation of this measure due to the lack of financing available.

3) Installation of three gas engines for the CMM utilization.

The technical design for power production by gas engines using CMM as fuel was prepared by CJSC 'Kotloenergoproekt' in 2008. At the time of the preparation of this PDD no decision has been made by the Samsonovska-Zakhidna mine regarding the implementation of this measure due to the lack of financing available.

At the time of this PDD preparation OJSC 'Krasnodonvugillya', the owner of Samsoniska-Zakhidna mine, has not made a final decision regarding investing into the three project measures listed above. To adopt the final decision regarding the investment, the substantial improvement of the project's financial indicators is needed. The project's profitability largely depends on the availability of the additional income from ERUs. For detailed financial analysis of the project please refer to Section B (additionality analysis).

CMM degasification activities

Drainage system consists of a mine degassing pipelines network and a vacuum pumping station which is located on the surface. CMM is removed from coal beds and surrounding rocks through drainage systems.

The construction of the new pumping station at the Samsonivska-Zakhidna mine has been completed in November 2007. Improvement of the CMM drainage system, however, does not have any effect on the need

to vent the captured CMM to the atmosphere, neither it is creating any additional incentives for the flaring or otherwise utilizing the CMM at Samsonovska-Zakhidna. Therefore the degasification activities before 2008 are not included into the project boundaries.

The following ventilation shafts are taken into account in the calculation of methane emissions:

Surface degasification: 2 channels; channel I – surface vacuum-pump station PPVNS-1 (eastern inclined longwall), methane flow is 0.141 m^3/sec, channel II – surface vacuum-pump station PPVNS-2 (sixth eastern inclined longwall) flow of methane is 0.116 m^3/sec;
Degasification: vacuum-pump station (VPS) (central industrial site), 1 channel - flow of methane 0.525 m^3/sec; Underground degasification; 2 channels, channel I (first eastern inclined longwall, flow of methane is 0.187 m^3/sec), channel II (sixth eastern inclined longwall, flow of methane is 0.338 m^3/sec).

Introduction of gas engines for CMM utilization

Electricity for the onsite consumption by the mine is supplied from the United Energy System of Ukraine ("UES"). It is planned to install three GE Jenbacher J 420 units with 1.416 MW of installed power capacity for each unit. Power efficiency of GE Jenbacher J 420 is 42.48%. Generated electricity will be supplied to the mine and will partially cover the electricity demand of the mine.

CMM flares installation

Flares KGUU-5/8 are enclosed flares with a nominal capacity of 5 MW; maximum capacity is 8 MW. Flaring process is controlled automatically by the unit's computer. Minimum flaring temperature is 850°C; minimum flaring efficiency is 99.9%. It is planned to install three KGUU-5/8 at Samsonivska-Zakhidna mine.

Switching of existing coal boilers KVTS-20-150 and KE-10/14 to methane

Thermal energy for the needs of Samsonivska-Zakhidna mine is currently produced by two coal boilers KE-10/14 (efficiency 87%) and KVTS-20-150 (efficiency 89%). Another KVTS-20-150 boiler is mothballed and not operated.

Existing coal boilers KVTS-20-150 and KE-10/14 will be reconstructed with subsequent switching to the use of methane as primary fuel. Burners on the side walls of the combustion chamber will be reconstructed; air and methane-air mixture supply to the burners will be improved; air regulating valves will be installed on air lines group that supplies air under the grate; screens reconstruction in boilers burners will be made, explosive valves will be installed on the boilers and economizers. As a result of the reconstruction, efficiency of both boilers will increase to 93%. Due to the reconstruction both boilers can work solely on CMM supplied from the degassing system.

Provisional schedule of the measures envisaged by the JI project is presented in Table 1

№	Activity	Designing start	Build start	Putting into operation
1	**CMM flaring system installation**			
1.1	Flare №1 installation	December 2008	June 2008	April 2009
1.2	Flare №2 installation	December 2008	June 2009	January 2010

1.3	Flare №3 installation	December 2008	June 2009	April 2010
2	**Gas engine installation**			
2.1	Unit №1 installation (GE Jenbacher J420, 1.416 MW)	December 2008	June 2010	January 2011
2.2	Unit №2 installation (GE Jenbacher J420, 1.416 MW)	December 2008	June 2010	January 2011
2.3	Unit №3 installation (GE Jenbacher J420, 1.416 MW)	December 2008	June 2010	January 2011
3	**Switching of existing coal boilers to methane**	December 2008	June 2010	January 2011

Table 1. Provisional schedule of project activities implementation

The staff responsible for KGUU 5/8 unit operation has passed training programme organized by OJSC "NPAO VNII Kompressormash", the equipment supplier. As a part of training, the staff was examined to prove familiarity with operation and maintenance procedures of KGUU 5/8. Protocols of the exams are kept in the archives of Samsonivska-Zakhidna mine. In addition to that, an extensive training programme will be necessary for the operation of the GE Jenbacher J-420 gas engines. Trainings regarding the operation of the gas engines will be organized before their commissioning in 2011.

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:

Utilization of methane as a fuel for electricity generation in gas engines, installed at the Samsonivska-Zakhidna mine, will reduce methane emissions into the atmosphere. Generated electricity will be used onsite to partially cover the needs of the mine, it will reduce CO_2 emissions originating from power generation in the UES of Ukraine.

Existing coal boilers will be reconstructed and switched to methane as fuel, further reducing CO_2 emissions. CMM burning in the flare units will also contribute to GHG emission abatement.

According to the Energy Strategy of Ukraine for the period until 2030, the use of coal is expected to grow significantly over the next twenty years. Coal is considered a national energy resource, which will be used to ensure energy independence of Ukraine. Improving of the Samsonivska-Zakhidna mine's safety, which will be achieved as a result of the proposed project, meets the declared priorities of Ukraine regarding the further development of the coal industry.

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

The estimated emission reductions during the Kyoto commitment period are presented below.

Length of crediting period:	4 years
Year	Estimate of annual emission reductions in tones of CO2e
2009	27 901
2010	102 302
2011	263 464
2012	263 464
Total estimated emission reductions over the crediting period (tones of CO2 equivalent)	**657 132**
Annual average of estimated emission reductions over crediting period (tonnes of CO2 equivalent)	**164 283**

The estimated emission reductions after 2012 are presented below.

Length of crediting period:	6 years
Year	Estimate of annual emission reductions in tones of CO2e
2013	263 464
2014	263 464
2015	263 464
2016	263 464
2017	235 564
2018	161 162
Total estimated emission reductions over the	**1 450 584**

crediting period (tones of CO2 equivalent)	
Annual average of estimated emission reductions over crediting period (tonnes of CO2 equivalent)	**241 764**

Table 2. Estimated emission reductions during the crediting period.

A.5. Project approval by the Parties involved:

The Project Idea Note (PIN) has been submitted to the National Environmental Investments Agency of Ukraine in April 2009. The project has received a Letter of Endorsement № 578/23/7 dated 03.06.2009.

Upon completing of the determination procedure, the PDD and the Determination report will be submitted to the National Environmental Investments Agency of Ukraine for receiving a Letter of Approval.

The acceptance of the project by the host party, Ukraine with a Letter of Endorsement and a Letter of Approval is expected.

The acceptance of the project by the investor party, the Netherlands with a Declaration of Approval is expected.

SECTION B. Baseline

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

Choice of methodology

Any baseline for a JI project should be set according to Annex B of the Marrakesh Accords[1]. According to the decision 10/CMP.1, the approved CDM methodologies can be used to develop PDD for JI projects. The JI specific approach based on the ACM0008 (version 06) "Consolidated methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical or motive) and heat and/or destruction through flaring or flameless oxidation" methodology, the Methodological "Tool to determine project emissions from flaring gases containing methane"[2] and the approach used in the JI projects which passed determination[3] has been used for baseline setting of this project.

Applicability of the methodology

The proposed project involves the use of degassing methane, which is captured by surface and underground drainage systems. This activity is included into the list of projects for which the chosen methodology can be applied.

[1] FCCC/CP/2001/13/Ann.2 16/CP.7

[2] CDM EB 28

[3] See JI PDD 0035 "Utilization of Coal Mine Methane at the Coal Mine named after A.F. Zasyadko"., JI PDD 0051 "Coal Mine Methane capture and utilization at Holodnaya Balka mine in Donetsk Oblast", JI PDD 0079 "CMM utilisation on the Joint Stock Company named Komsomolets Donbassa Coal Mine of DTEK"

The proposed project meets the following requirements of the ACM0008 methodology (version 06):

- Methane is captured and destroyed by the flaring, and also is recycled to produce heat and electricity;
- Unused methane can be released (by ventilation) to the atmosphere;
- All methane amounts which are included into design calculations will be either flared or recycled for heat and electricity production;
- The Samsonivska-Zakhidna mine is not an open cast mine;
- The Samsonivska-Zakhidna mine is in operation, and will be in operation throughout the crediting period;
- There is no capture of virgin coal-bed methane;
- There is no usage of CO_2 or any other fluid/gas to enhance CMM drainage before the coal mining.

The proposed project is to be implemented at an existing mine. Forecast for CMM capturing and using has been developed according to the recommendations of the chosen methodology for calculating baseline emissions and leakages and is presented below in this PDD.

Hence ACM0008 (version 06) is fully applicable to the proposed JI project.

Determination of the baseline scenario

Step 1. Identification of technically feasible options for capturing and/or using CMM

Step la. Options for extraction

According to the chosen methodology, alternative baseline scenarios should list all technically feasible options of CMM production, which comply with safety regulations. The options are:

A. Pre mining CMM extraction, including direct and / or indirect methane pumping from the coal beds to the drainage wells.
B. Post mining methane extraction.
C. Possible combinations of options A and B with the specified relative shares of gas.

It should be mentioned that the concentration of vented methane is low (0.1 - 1%); that is why its utilization is technically difficult. In the case of the Samsonivska-Zakhidna mine, methane, which is extracted in pre and post mining operations, is going through the boreholes to the underground degassing system. The collected methane is transported to the surface with pumps. Given the characteristics of the mine drainage system, it is impossible to determine the shares of methane that enters the system in ways that are described under the items A and B above, because all of the drainage wells are united into the degassing system, and gather methane as long as it is in operation before, during, and after mining. The concentration of degassing methane is 35-52%. Thus, Alternative B is the only technically feasible option for utilization purposes.

Step lb. Options for extracted CMM treatment

Several alternatives can be taken to treat the captured CMM of the project:

(i) Venting
(ii) Using / destroying ventilation air methane rather than venting it
(iii) Flaring of CMM
(iv) Use for additional grid power generation

(v) Use for additional captive power generation
(vi) Use for additional heat generation
(vii) Feed into gas pipeline (to be used as fuel for vehicles or heat / power generation)
(viii) Possible combinations of alternatives i to vii with the relative shares of gas treated under each option specified

All these alternatives are considered as options for CMM treatment. In the step 3 of this section some of these options will be further developed into baseline scenario alternatives. The project activity is covered by the combination of options iii, v and vi.

Step 1c. Options for energy production

The options for energy production are included in the options iv. to viii. listed in sub-step 1b. The project activity is covered by the option viii. – the combination of option iii. flaring, option v. use for additional captive power generation, and option vii. use for additional heat generation.

Step 2. Eliminate baseline options that do not comply with legal or regulatory requirements

National polices in the field of mining industries are regulated by the following laws:
1) Ukraine's Code "On mineral wealth" № 132/94-BP;
2) The Law "On environmental protection" № 1264-12;
3) The Law "On labour protection" № 2694-12;
4) "The mining law of Ukraine" № 1127-XIV;
5) The Law "On coal mine gas (methane)" № 1392-VI.

None of these laws is prohibiting the release of coal mine methane into the atmosphere.

According to the existing national safety regulation in Ukraine, CMM should be extracted. However, there is no regulation in place that would require any specific utilization of the extracted methane. Also, there is no regulation that would prohibit the use of methane for energy production. Therefore, all the alternatives listed in sub-step lb are in compliance with the existing regulations.

Step 3. Formulation of baseline scenario alternatives

Possible alternative scenarios of the project were identified in sub-steps 1b and 1c. All these options are in compliance with the national legislation. According to the national safety standards all mining enterprises are required to extract the CMM from the mine. However, there is no national legislation, which would require mines to any utilization of captured CMM. Therefore, all alternative scenarios should include methane drainage to the degassing system of the Samsonivska-Zakhidna mine. Detailed description of alternative baseline scenarios are given below.

Alternative i. - Venting of CMM
There is no regulation in place that would require any specific utilization of the extracted methane. It is common practice at Ukrainian coal mines to release the CMM into the atmosphere. This scenario describes the current situation at the Samsonivska-Zakhidna mine, when the whole captured CMM is vented to the atmosphere. According to this option, on-site heat demand would be supplied by the coal fired on-site boilers; while electricity would be supplied by the national grid.

Alternative ii. Using/destroying ventilation air methane rather than venting it
Due to very low concentration of vented methane (<1%), its treatment or flaring would be extremely difficult

technically. Currently there is no technology in Ukraine that would allow treatment or flaring gas with such a low methane concentration. Also, there are no examples of successful implementation (or at least plans for implementation) of this kind of technologies in Ukraine, so this scenario would be the first example of such technology. According to this option, on-site heat demand would be supplied by the coal fired on-site boilers; while electricity would be supplied by the national grid.

Alternative iii. Flaring of CMM
There is no national regulation in place that would require flaring of the extracted CMM. This scenario includes flaring of methane extracted from the mine degassing system; ventilation methane is not taken into account. The concentration of methane gas, which is extracted from the mine degassing system is 35-52%, thereby degassing methane may be destroyed by flaring. In the absence of project activities, there is no methane flaring equipment on-site. $1.44 million of investments is needed to install the flaring equipment. Without revenues from JI mechanisms this alternative would not generate any revenues. On the other hand, costs to purchase the equipment for methane flaring would be impossible to recover in this scenario.

The activity under this alternative represents a part of the project scenario, see alternative viii.

Alternative iv. Use for additional grid power generation
In this scenario degassing methane will be used for power generation, the power is to be supplied to the national grid. On-site heat demand would be supplied by the coal fired on-site boilers; while electricity would be supplied by the national grid.

Alternative v. Use for additional captive power generation
As in the previous alternative scenario, CMM will be used for power generation. Produced power will partially or completely satisfy the mine's power demand and substitute the power previously consumed from the national grid. Power supply to the national grid is not foreseen. On-site heat demand would be supplied by the coal fired on-site boilers.

The activity under this alternative represents a part of the project scenario, see alternative viii.

Alternative vi. Use for additional heat generation
The captured methane could be utilized for heat generation in addition to existing thermal boilers at the Samsonivska-Zakhidna mine. Additionally generated heat will be used outside the coal mine facilities. Since existing boilers of the coal mine are supposed to supply only the coal mine facilities, a new heat generation plant should be constructed and connected to a heating system outside the coal mine. On-site heat demand would be supplied by the coal fired on-site boilers; while electricity would be supplied by the national grid.

The activity under this alternative represents a part of the project scenario, see alternative viii.

Alternative vii. Feed into a gas pipeline
Within this alternative CMM captured at the Samsonivska-Zakhidna mine will be fed into gas pipeline and subsequently used by external consumers, who receive gas through Ukraine's gas pipeline system. Depending on the quality specification of the pipeline operator, most likely an additional methane enrichment plant could be required. On-site heat demand would be supplied by the coal fired on-site boilers; while electricity would be supplied by the national grid.

Alternative viii. Possible combinations of alternatives i. to vii.
There are numerous possible combinations of the alternatives i. to vii., therefore only the proposed project scenario without JI incentives will be described. The following measures are to be implemented:

1) Installation of three CMM KGUU-5/8 flares.
2) Reconstruction and conversion of the existing coal boilers KE-10/14 and KVTS-20-150 to use the methane as fuel. All heat that is generated by boilers will be used internally for the needs of the Samsonivska-Zakhidna mine. Boilers will fully cover the internal heat demand for mine's operations.
3) Installation of three gas engines GE Jenbacher J-420 with 1.416 MW of installed capacity each. All electricity produced by the gas turbines will be used internally for the needs of the Samsonivska-Zakhidna mine. Installed gas engines will cover about 50% of the power demand at the Samsonivska-Zakhidna mine, the remaining power will be supplied by the national grid.

Changes in the utilization of degassing methane after the implementation of planned activities under this scenario is presented below in Table 3. Since the JI mechanism is not used in this scenario, the sources of income will be: a) savings through non-use of coal as fuel for boilers, b) savings due to the partial replacement of power consumption from the national grid to on-site production.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Flares	3,4%	12,5%	13,6%	13,6%	13,6%	13,6%	13,6%	13,6%	10,2%	1,1%
Boilers	0,0%	0,0%	4,7%	4,7%	4,7%	4,7%	4,7%	4,7%	4,7%	4,7%
Gas engines	0,0%	0,0%	8,5%	8,5%	8,5%	8,5%	8,5%	8,5%	8,5%	8,5%
Vented degassing CMM	96,6%	87,5%	73,3%	73,3%	73,3%	73,3%	73,3%	73,3%	76,7%	85,7%

Table 3. Utilisation of degassing methane, 2009-2018

Step 4. Elimination of 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.

Alternative i. Venting of CMM
The existing national regulations require that captured CMM has to be vented for safety reasons. On the other hand, there are no national or local regulations that require mines to utilize CMM. This alternative represents the current situation in the absence of the proposed JI project activity. There are no barriers or external incentives that might change the business as usual activities at the Samsonivska-Zakhidna mine. Therefore, this scenario can be considered to be a realistic alternative.

Alternative ii. Using/destroying ventilation air methane rather than venting it
As already mentioned under Step 3, at the time of writing of this document there is no technology in Ukraine that would allow treatment or flaring gas with such a low methane concentration (less than 1%), which is concentration of the methane in the ventilation air. Also, there are no examples of successful implementation (or at least plans for implementation) of this kind of technologies in Ukraine. This scenario faces significant risk associated with the implementation of new and unproven technology. Due to high risk this alternative faces prohibitive barrier and should be excluded from further consideration.

Alternative iii. Flaring of CMM
Flaring of CMM is not required by the existing national or local regulation. Additional investment has to be made by the project owners to install the flares. Without revenues from JI mechanism no income but only costs are generated, since the investment will not generate any revenues. This scenario is facing a strong prohibitive financial barrier. However, the activity described under this

scenario is part of the project scenario and may be implemented in case additional revenue from selling ERUs under JI mechanism is available.

Alternative iv. Use for additional grid power generation
Degassing methane can be used as fuel for power generation. Under this alternative, all generated electricity is supplied to the national grid. Heat is not generated under this alternative. Installed power capacity can be estimated at 4.25 MW, the same as in the alternative (viii) regarding the power generation part. Installing of such capacity will require significant investments - equivalent to more than $4 million. At the same time, heat generation from methane for on-site use is not included here. Thus, in this alternative there is no significant source of income from savings generated by reducing coal consumption for heat generation. The alternative faces financial barrier, which is more significant compared to the use of methane to produce both heat and electricity. Therefore, this alternative should be eliminated from further consideration. More detailed discussion on the economic aspects of power generation using the degassing methane as a fuel will be provided in section B.2 (analysis of additionality).

Alternative v. Use for additional captive power generation
This alternative is quite similar to the previous one (iv). Three GE Jenbacher J-420 gas engines with the capacity of 1.416 MW each will be installed. The gas engines do not generate any heat for the mine's needs; heat for the Samsonivska-Zakhidna mine will be generated by existing coal boilers. All electricity produced by the gas engines will be used internally for the needs of the Samsonivska-Zakhidna mine and will provide about 50% of its power needs. Similarly to the previous alternative (iv), this scenario is facing financial barriers and is less economically attractive compared with the combined generation of heat and electricity using methane. Therefore, this alternative is excluded from further consideration. However, the activity under this scenario is a part of the project scenario and is realistic if additional revenue from selling ERUs generated under JI mechanism is available.

Alternative vi. Use for additional heat generation
Under this alternative, heat for the Samsonivska-Zakhidna mine will be generated by existing coal boilers. The nearest external heat consumer is the town of Molodogvardiysk with the population of about 29 000 people. The city is located approximately 7 km away from the Samsonivska-Zakhidna mine.
Under the alternative a new heating network has to be built; it will connect the district heating system of Molodogvardiysk with the mine. Given rather large distance to potential customer, construction of the heating network is not feasible because of significant heat losses during the heat transmission as well as a need to compete with the existing heat providers. This alternative faces technical and financial barriers. Therefore, it should be eliminated from further consideration.

Alternative vii. Feed into a gas pipeline
Under this alternative building of the methane enrichment plant is required, which will increase the methane concentration in gas captured by the degassing system for further feeding into the national gas pipelines. The cost of construction of the enrichment plant poses significant financial barrier. Therefore, it should be eliminated from further consideration.

Alternative viii. Possible combinations of alternatives i. to vii.
This alternative describes the project scenario not registered as JI Project.
Implementation of the measures of the scenario described in Step 3 requires significant investment and introduction of new technologies, which have not been used before at the Samsonivska-Zakhidna mine. Besides, relatively low prices for coal used for heat generation by existing boilers, and relatively low prices for power from the national grid result in unsatisfactory financial indicators of the proposed project. Thus, this alternative faces significant financial barriers and should be eliminated from further consideration. More detailed discussion of economic performance of this alternative will be provided in Part B.2 (analysis of

additionality) of this document.

Conclusion

There is only one realistic option for the baseline scenario, which is the continuation of the current situation: venting of the CMM into the atmosphere, heat generation with the existing coal fired boilers, and purchase of electricity from the grid.

Key parameters to be monitored

Data / Parameter:	$CMM_{BL,i}$
Data unit:	tCH_4
Description:	CMM that would have been captured, used and destroyed by use *i* in the baseline scenario in year *y*
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Defined in Section D.1
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	CEF_{ELEC}
Data unit:	tCO_2/MWh
Description:	Carbon emission factor for the power savings in the Ukrainian grid
Time of determination/monitoring	
Source of data (to be) used	JI project 0018 "Introduction of energy efficiency measures at ISTIL mini steel mill"
Value of data applied (for ex ante calculations/determinations)	0.896
Justification of the choice of data or description of measurement methods and procedures (to be) applied	JI project 0018 "Introduction of energy efficiency measures at ISTIL mini steel mill". The grid factor will be updated in case an updated grid factor for Ukraine is developed.
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	CEF_{COAL}
Data unit:	tCO_2/GJ
Description:	Carbon emission factor for coal

Time of determination/monitoring	
Source of data (to be) used	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national greenhouse gas inventories. (Volume 2 (Energy), 1996), Section 1.2.1, Table 1-2
Value of data applied (for ex ante calculations/determinations)	0.0983
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	MM_{FL}
Data unit:	tCH_4
Description:	Methane measured sent to flares
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Defined in Section D.1
QA/QC procedures (to be) applied	
Any comment:	Flow meters will record gas volumes, pressure and temperature.

Data / Parameter:	MM_{ELEC}
Data unit:	tCH_4
Description:	Methane measured sent to gas engines
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Defined in Section D.1
QA/QC procedures (to be) applied	
Any comment:	Flow meters will record gas volumes, pressure and temperature.

Data / Parameter:	MM_{HEAT}
Data unit:	tCH_4
Description:	Methane measured sent to boilers
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Defined in Section D.1
QA/QC procedures (to be) applied	
Any comment:	Flow meters will record gas volumes, pressure and temperature.

Data / Parameter:	Eff_{ELEC}
Data unit:	%
Description:	Efficiency of methane destruction/oxidation in the gas engines
Time of determination/monitoring	
Source of data (to be) used	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national greenhouse gas inventories. (Volume 2 (Energy), 1996), Section 1.2.1, Table 1-4
Value of data applied (for ex ante calculations/determinations)	99.5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	Eff_{HEAT}
Data unit:	%
Description:	Efficiency of methane destruction/oxidation by boilers
Time of determination/monitoring	
Source of data (to be) used	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national greenhouse gas inventories. (Volume 2 (Energy), 1996), Section 1.2.1, Table 1-4
Value of data applied (for ex ante calculations/determinations)	99.5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).

QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	Eff_{FL}
Data unit:	%
Description:	Efficiency of methane destruction/oxidation by flares
Time of determination/monitoring	
Source of data (to be) used	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national greenhouse gas inventories. (Volume 2 (Energy), 1996), Section 1.2.1, Table 1-4
Value of data applied (for ex ante calculations/determinations)	99.5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This is a conservative assumption
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	CEF_{NMHC}
Data unit:	$tCO_2/tNMHC$
Description:	Carbon emission factor for combusted non methane hydrocarbons (various)
Time of determination/monitoring	
Source of data (to be) used	Independent expert
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	To be obtained through periodical analysis of the fractional composition of captured gas

Data / Parameter:	PC_{CH4}
Data unit:	%
Description:	Concentration (in mass) of methane in extracted gas, measured on wet basis
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine

Value of data applied (for ex ante calculations/determinations)	35
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Based on historical data
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	PC_{NMHC}
Data unit:	%
Description:	Concentration (in mass) of NMHC in extracted gas
Time of determination/monitoring	
Source of data (to be) used	Independent expert
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential of methane
Time of determination/monitoring	
Source of data (to be) used	Decision FCCC/CP/1999/7, page 14
Value of data applied (for ex ante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	CEF_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Carbon emission factor for combusted methane
Time of determination/monitoring	

Source of data (to be) used	ACM0008 methodology (version 06).
Value of data applied (for ex ante calculations/determinations)	44/16 = 2.75
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

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

The volume of CMM flared at KGUU-5/8 units and used as fuel for boilers and gas engines would otherwise be released into the atmosphere. The heat generated with the use of CMM as fuel would otherwise be produced with the use of coal. The electricity produced by the gas engines using CMM as fuel would otherwise be consumed from the grid, therefore leading indirectly to the fuel combustion by the grid power plants. Please refer to the Section E for the detailed breakdown of the emissions in the baseline and project scenario, as well as the emission reductions.

In accordance with the chosen methodology, additionality has to be proven by applying the "Tool for demonstration and assessment of additionality", (version 05.2).

Step 1: Identification of alternatives to the project activity in accordance with the current laws and regulations
Possible alternative options for the proposed JI project have been analyzed in section B.1 above. According to the chosen methodology, this step is ignored.

Step 2: Investment analysis

Sub-step 2a: Determine appropriate analysis method

The proposed JI project should generate revenues by reducing the use of coal for heat generation as well as by decreasing spendings for power purchase from the national grid. Therefore, simple cost analysis (Option I) is not applicable for this project.

Obtaining financial indicators for similar projects in Ukraine is problematic as this project is one of the first in its kind. Similar projects are proposed as JI projects and are at various stages of registration[4]. Therefore the investment comparison analysis (Option II) cannot be performed for the identified alternatives and the benchmark analysis (Option III) will be used to test the additionality of the proposed JI project activity.

Sub-step 2b: Option III. Apply benchmark analysis

[4] See JI PDD 0035 "Utilization of Coal Mine Methane at the Coal Mine named after A.F. Zasyadko"., JI PDD 0051 "Coal Mine Methane capture and utilization at Holodnaya Balka mine in Donetsk Oblast", JI PDD 0079 "CMM utilisation on the Joint Stock Company named Komsomolets Donbassa Coal Mine of DTEK", and others.

Due to economic recession interest rates for commercial loans in Ukraine have increased significantly reaching 30-35% for loans in the local currency in the first quarter of 2009[5]. Vladimir Lavrenchuk, chairman of the Raiffeisen Bank Aval, points out how current interest rate of 30% makes business much more complicated[6].

Acceptable internal rate of return (IRR) for the project can be calculated as the sum of coefficients for low-risk investments and risk factors. In June 2009 the profitability of medium-and long-term bonds denominated in Ukrainian Hryvnia and with maturity in two or three years, was within 22.5% and 22.67%[7]. Thus, the required IRR, excluding certain project risks, can be estimated at 22.59%. Due to the lack of data on similar projects in Ukraine, the risk adjustment factor can be determined only on the basis of expert evaluation. Applying a conservative approach to risk assessment using the methodology proposed by the official recommendations for the investment projects evaluation by June 21, 1999 NBC adopted in Russia[8], the risk factor is 8%. Thus, according to conservative risk estimates excluding risk factor, the IRR reached 30.59% (22.59% + 8%).

Sub-step 2c: Calculation and comparison of financial indicators

Estimated nominal (inflation-adjusted) IRR of the project without selling emission reduction units, is 26.97%, which is below the benchmark set[9]. Due to the current economic situation in Ukraine, OJSC 'Krasnodonvugillya' would only invest into the measures with robust economic parameters; in particular the expected project's IRR should be substantially higher compared to the benchmark set in order to guarantee the future return of the investments. In addition to comparatively low IRR the proposed project faces a numer of barriers, in particular the barrier of the prevailing practice, and the financial barrier due to the limited availability of project financing in Ukraine[10]. Sale of emission reduction units makes the project more financially feasible and increases the IRR to 67.98%. Strong financial parameters of the proposed project in case of ERU commercialization also allow to minimize the risks identified. Thus, according to investment analysis, the project is additional.

Existing estimates of internal rate of return prove the project has unsatisfactory payback time and is not feasible without the ERU sale.

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[5] On-line resource, http://finance.bigmir.net/useful_articles/credits/83611 (cited 19.10.2009)

[6] On-line resource, http://www.ricardo.com.ua/invest/news_invest/69321 (cited 19.10.2009)

[7] Website of the National Bank of Ukraine: http://bank.gov.ua?Fin_ryn/OVDP/OVDP_mis.xls (cited 25.08.2009)

[8] There is no officially adopted methodology in Ukraine.

[9] The gas engines' capacity utilization was considered at 0.667. The gas engines are complicated equipment and stopovers in the operation become more likely due to the use of CMM, having inferior quality compared to the natural gas, which is the intended fuel for the Jenbacher engines. Stopovers may be caused by: 1) Unexpected drop of methane concentration, causing emergency stop of the operation; 2) Unexpected drop of methane flow below the required level; 3) Unexpected stops due to impurities in the CMM. The assumptions given above can be well proven by the example of Zasyadko coal mine, where only one out of three CHP sites was operational in the latest period of 01.10.2009 – 31.01.2010. The electricity generated from CMM at the period mentioned was 43 975 MWh, compared to the 120 732 MWh expected according with the PDD (utilization rate of CHPs estimated in the PDD was 6800 hours / year). For further reference please see the monitoring report #5 of the project JI 0035: Utilization of Coal Mine Methane at the Coal Mine named after A.F. Zasyadko, http://ji.unfccc.int/UserManagement/FileStorage/3CWZ1XUKV5YSIGO0PD2QNR9TMJAHBE

[10] For more detailed analysis of the barriers that might prevent the implementation of the proposed project please see Step 3 (Barrier analysis) below.

Sub-Step 2d: Sensitivity analysis

The profitability of the proposed JI project relies on the market prices of fuel (coal) electricity and decreasing capital investment. Any future fluctuations of the coal and/or power prices may have a certain effect on the overall economic performance of the project. The initial cost of project also has significant influence on economic indicators. Sensitivity analysis was conducted for the following variables: the price of coal up 10%, and the price of electricity up 10%, capital investment -10%. Internal rate of return is low in scenario of the increased price of coal and in case of increased price of electricity and higher in case of decreased capital investment (please see the table 4 below). The decreasing of capital investment is not a viable case. The project does involve large number of similar measures. So the possibility to obtain additional price reduction from equipment supplier or contractors is negligible. In addition, the project owner cannot base the decision regarding the project implementation on the unlikely case of capital investment drop that does not correspond to the current situation and forecasts.

	IRR value
No change compared to the used price forecast	26.97%
Coal price up 10%	27.22%
Electricity price up 10%	29.33%
Capital Investment down 10%	31.74%

Table 4. Sensitivity analysis

This indicates that the income from the sale of carbon units remains an important component in the project overall.

Step 3. Barrier analysis

Sub-step 3a. Barrier identification

According to the chosen methodology, barrier analysis is not mandatory. Nevertheless, the project faces a number of serious barriers, which are listed below.

a) Limited access to financial resources

Access to the international financial resources is extremely limited for the proposed project. Investment climate in Ukraine is rather poor, especially in comparison with neighbouring countries. Fitch sovereign rating for Ukraine compared with some neighbouring Eastern European countries is given below:

- Ukraine B +
- Poland A –
- Hungary BBB
- Slovakia A +

Taking into account the significant amount of investments necessary for the proposed project, obtaining financing from international sources can be quite difficult. Financing opportunities at the national level are also limited. Currently, the commercial banks in Ukraine provide project financing at the interest rate about 30% in local currency for up to three years. Examples include such major Ukrainian banks as Raiffeisen Bank Aval (www.aval.ua), Privatbank (www.privatbank.com.ua), Pravexbank (www.pravex.com.ua). Limited access to financial resources is a major barrier for the proposed project implementation.

b) Barriers due to prevailing practices

Utilization of CMM is not required under existing national legislation or other regulations in Ukraine. Therefore, existing coal mines capture CMM for the security reasons with further venting it to the atmosphere. Activities similar to this proposed project are implemented as JI projects[11]. The owners of the Samsonivska-Zakhidna mine would put themselves at a disadvantage position relatively to other coal producers in case of the proposed project implementation without the JI incentives, by bearing the additional costs associated with the project, as well as the risks of unexpected interruptions or breakdowns in the course of new equipment operation. The prevailing practice constitute a serious barrier for the proposed JI project.

Conclusion: the prevailing practices in Ukraine and limited access to financial resources constitute substantial barriers to the proposed project's implementation.

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

The only viable alternative to the proposed JI activity is the 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.

Step 4. Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity

The common practice at the existing coal mines in Ukraine is CMM capture and further ventilation to the atmosphere without utilization for heat or power generation. Existing examples of the implementation of projects similar to the proposed project scenario, are JI projects. See JI PDD 0035 "Utilization of Coal Mine Methane at the Coal Mine named after A.F. Zasyadko"., JI PDD 0051 "Coal Mine Methane capture and utilization at Holodnaya Balka mine in Donetsk Oblast", JI PDD 0079 "CMM utilisation on the Joint Stock Company named Komsomolets Donbassa Coal Mine of DTEK", and others.

Sub-step 4b: Discuss any similar Options that are occurring

The options proposed within the project activity, such as CMM use as fuel for heat or power production, or CMM flaring, are not occurring in Ukraine. The exceptions are only Joint Implementation projects (see examples under Sub-step 4a above).

Taking into account the information provided under the Step 4, the project scenario is not the common practice.

Conclusion

Registration of the proposed project as a JI project will bring additional financing from the sale of emission reduction units, which in return will allow to overcome the financial barriers and barriers associated with the prevailing practice. Project scenario is additional compared with the baseline scenario.

[11] See JI PDD 0035 "Utilization of Coal Mine Methane at the Coal Mine named after A.F. Zasyadko"., JI PDD 0051 "Coal Mine Methane capture and utilization at Holodnaya Balka mine in Donetsk Oblast", JI PDD 0079 "CMM utilisation on the Joint Stock Company named Komsomolets Donbassa Coal Mine of DTEK", and others.

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

The boundaries of the project include all sources of CO2 emissions, which are included in the calculation of greenhouse gas emissions in the project. The sources of emissions which are included in or excluded from the boundaries for the baseline scenario are listed in the Table 5 below.

№	Source	Gas[12]	Included/ Excluded	Justification/Explanation
1	CMM captured by degassing system and vented to the atmosphere	CH_4	Included	The main source of GHG emissions in the baseline scenario
2	CMM captured by the ventilation system and is venting to the atmosphere	CH_4	Excluded	The total volume of venting methane emissions does not change in the project scenario compared to the baseline
3	Electricity consumed by the Samsonivska-Zakhidna mine and displaced by the captive power generation in the project scenario	CO_2	Included	GHG emissions related to the grid power generation
4	Coal consumed by boilers at Samsonivska-Zakhidna mine	CO_2	Included	Direct emissions from coal combustion in the mine's boilers
5	Emissions related to coal transportation to the Samsonivska-Zakhidna mine	CO_2	Excluded	The Samsonivska-Zakhidna mine purchases coal for heat boilers. Emissions related to coal transportation are excluded for simplicity. This assumption is conservative.

Table 5. Emission sources included in or excluded from the baseline scenario

Figure 3 shows the boundaries of the baseline scenario, which is continuation of the existing situation at the Samsonivska-Zakhidna mine. Dotted line indicates the boundaries of the baseline scenario.

[12] Direct CO_2 emissions originating from coal or CMM combustion, and CMM venting into the atmosphere are taken into account. Emissions of CH_4 and N_2O originating from fossil fuel combustion were excluded from the calculations. As a result, the overall reduction of CH_4 and N_2O emissions are not included into the estimation of the emission reductions. This is a conservative assumption.

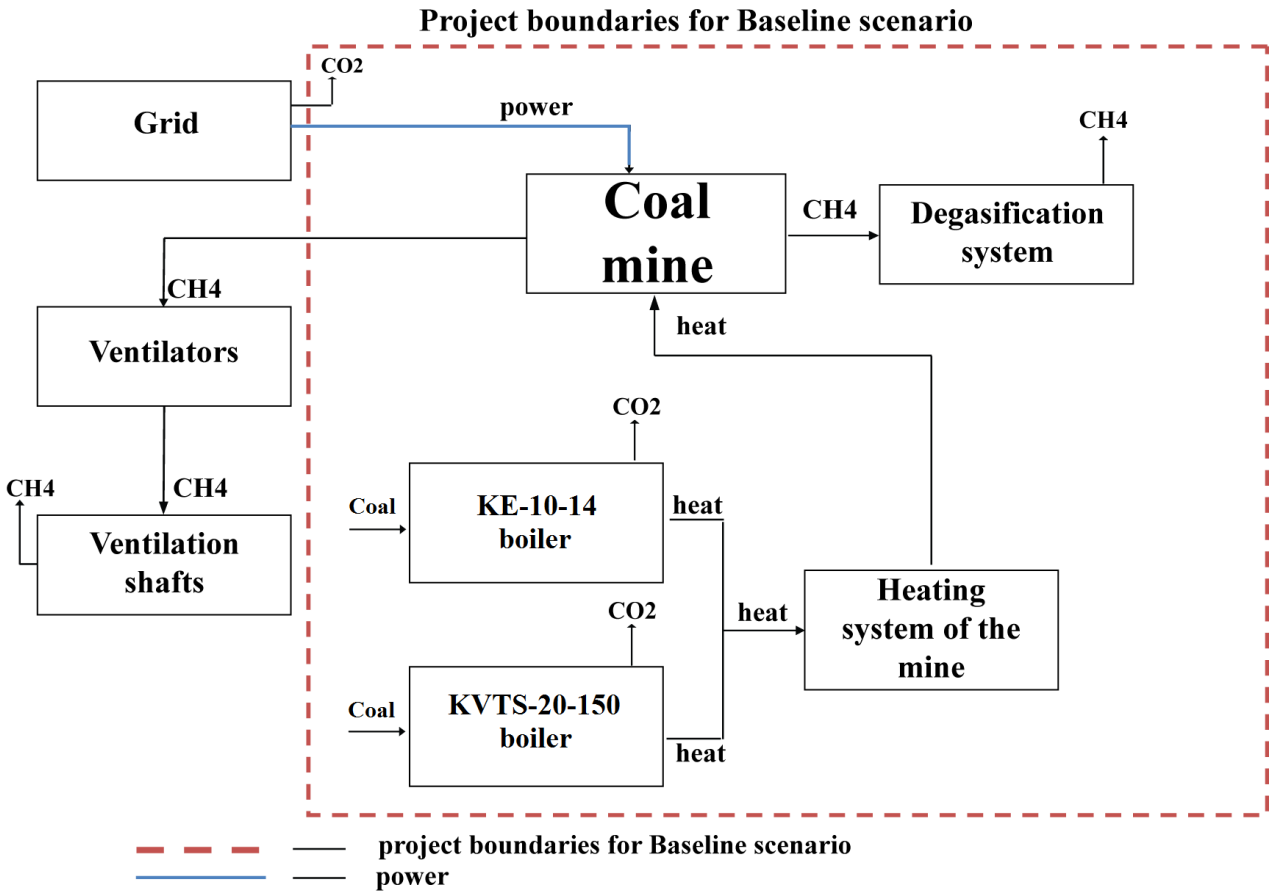

Figure 3. Baseline scenario boundaries

The sources of emissions which are included or excluded from the boundaries of the project scenario are listed in Table 6 below.

№	Source	Gas[13]	Included/ Excluded	Justification/Explanation
1	CMM captured by degassing system and vented to the atmosphere	CH_4	Included	Volume of the degassing methane which is captured and vented to the atmosphere in the project scenario.
2	CMM captured by the ventilation system and vented to the atmosphere	CH_4	Excluded	The total volume of venting methane emissions does not change in the project scenario compared to the baseline
3	Captive generation of electricity with the use of CMM at the	CO_2	Included	GHG emissions related to the grid power generation displaced

[13] Direct CO_2 emissions originating from coal or CMM combustion, and CMM venting into the atmosphere are taken into account. Emissions of CH_4 and N_2O originating from fossil fuel combustion were excluded from the calculations. As a result, the overall reduction of CH_4 and N_2O emissions are not included into the estimation of the emission reductions. This is a conservative assumption.

	Samsonivska-Zakhidna mine			by the captive power generation
4	Coal consumed by boilers at the Samsonivska-Zakhidna mine	CO_2	Included	Direct emissions from coal combustion in the mine's boilers
5	Emissions related to coal transportation to the Samsonivska-Zakhidna mine	CO_2	Excluded	The Samsonivska-Zakhidna mine purchases coal for heat boilers. Emissions related to coal transportation are excluded for simplicity. This assumption is conservative.
6	Emissions related to the CMM combustion by flares	CO_2	Included	CO_2 emissions, which are generated as a result of methane combustion by KGUU-5/8 flares.
7	Emissions related to the CMM combustion by boilers	CO_2	Included	CO_2 emissions, which are generated as a result of methane combustion by mine boilers for heat generation.
8	Emissions related to the CMM combustion by gas engines	CO_2	Included	CO_2 emissions, which are generated as a result of methane combustion by gas engines for power generation.
9	Emissions from NMHC destruction	CO_2	Included	CO_2 emissions originating from NMHC combustion. The NMHC content in CMM will be controlled by an independent expert. In case of NMHC content in the CMM over 1% of the extracted coal mine gas the respective emissions from NMHC combustion will be included. At the moment of PDD writing no NMHC content over 1% is expected in the extracted CMM.
10	Fugitive emissions of unburned methane	CH_4	Included	Small amounts of methane will remain unburned in flares, flameless oxidizers or heat/power generation.
11	Fugitive methane emissions from on-site equipment	CH_4	Excluded	Excluded for simplification in accordance with the methodology used.
12	Fugitive methane emissions from gas supply pipeline or in relation to use in vehicles	CH_4	Excluded	Excluded for simplification in accordance with the methodology used.
13	Accidental methane release	CH_4	Excluded	Excluded for simplification in accordance with the methodology used.
14	Electricity consumption for methane flares operation	CO_2	Excluded	This source of emissions is negligible (less than 1% of the project scenario emissions) and

				therefore is excluded for simplification.

Table 6. Emission sources included in or excluded from the project scenario

Figure 4 below shows the boundaries of the project scenario, with the dotted line.

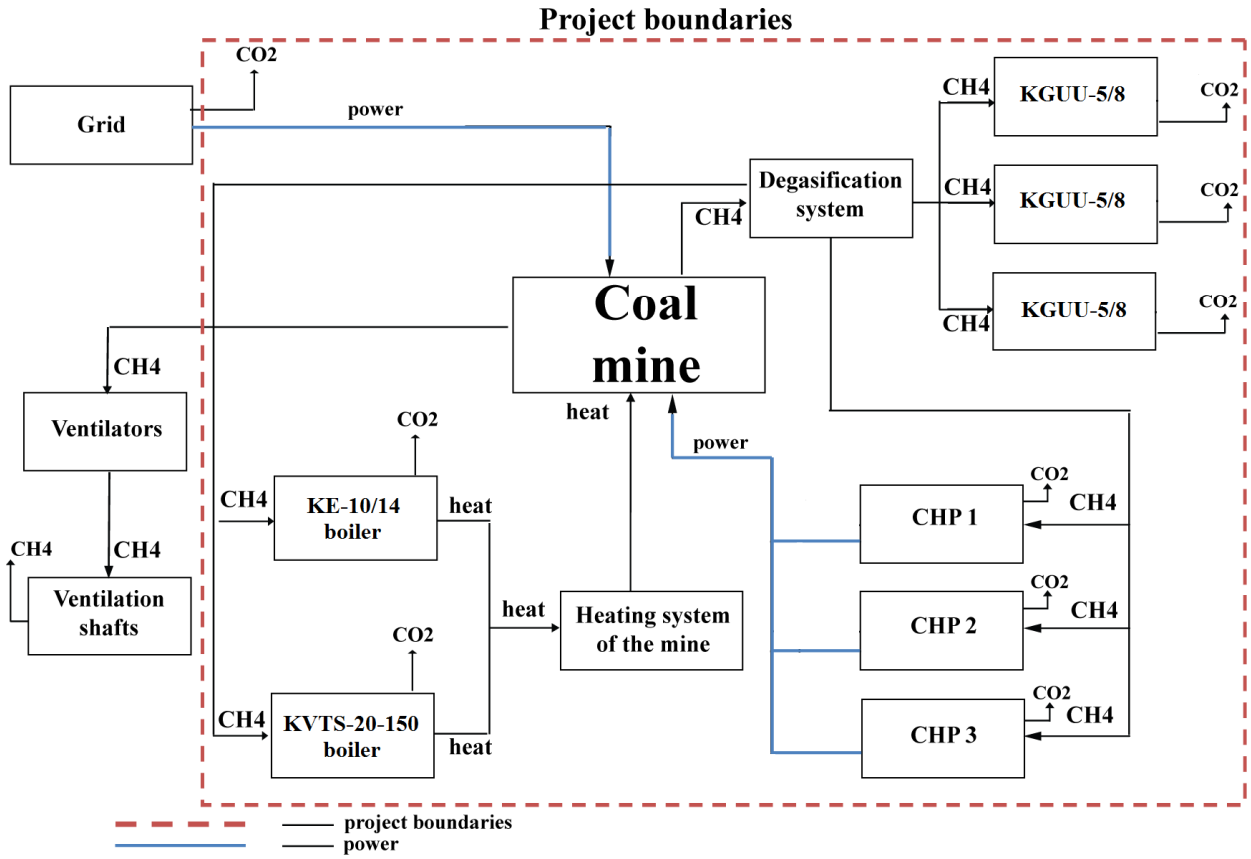

Figure 4. Project scenario boundaries

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

This baseline is set by the PDD developer, "GreenStream Network", on behalf of OJSC "Krasnodonvugillya" 30/10/2009.

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

The starting date of the project is 22/04/2008. Project activity has started on 01/04/2009 with the launch of the first KGUU-5/8 unit.

C.2. Expected operational lifetime of the project:

The existing equipment at the Samsonivska-Zakhidna mine (including boilers KE-10/14 and KVTS-20-150) can be operated at least until 2018. Lifetime of the KGUU-5/8 flare is eight years. The guaranteed operational time of GE Jenbacher J-420 engines is 200 000 hours before the major repair, or about 24 years on average.

Therefore, the expected operational lifetime of the project is 10 years or 120 months.

C.3. Length of the crediting period:

10 years (120 months) since the starting date of the project operation (01/04/2009)

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:

Collected monitoring data shall be archived in electronic and/or paper format. The measurements are to be done by the calibrated measurement equipment in accordance with the industrial standards. Some parameters outlined below in the table "Variables" need to be monitored over the crediting period following the procedures for baseline settings and guidelines for the "frequency of monitoring".

The main indicator, which reflects the actual emission reductions, is a decrease of fossil fuel consumption due to the CMM utilization.

The JI specific approach based on the ACM0008 (version 06) "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 or flameless oxidation" methodology, the Methodological "Tool to determine project emissions from flaring gases containing methane"[14] and the approach used in the JI projects which passed determination[15] has been used for establishing the monitoring plan for this project.

Methodology ACM0008 is applicable for the projects, aiming at the CMM capture, utilization, and destruction at the operational coal mines, where the baseline comprises partial or complete methane escape to the atmosphere, and the project activity includes following measures:

- Methane capture and destruction through flaring;
- Methane capture and destruction through utilization for the electricity, motive energy, and heat production

Methodological "Tool to determine project emissions from flaring gases containing methane" can be applied under following conditions:

- Gas flow for flaring does not contain any other combustible gases, except methane, carbon monoxide, and hydrogen;
- Gas flow for flaring has to be received from organic decomposition or gases, being vented in the coal mines (CMM)

[14] CDM EB 28

[15] See JI PDD 0035 "Utilization of Coal Mine Methane at the Coal Mine named after A.F. Zasyadko"., JI PDD 0051 "Coal Mine Methane capture and utilization at Holodnaya Balka mine in Donetsk Oblast", JI PDD 0079 "CMM utilisation on the Joint Stock Company named Komsomolets Donbassa Coal Mine of DTEK"

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
К1	Methane collected by the degasification system	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	m^3	m	Continuous	100 %	Electronic and paper	
К2	Methane sent to flares	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	m^3	m	Continuous	100 %	Electronic and paper	
К3	Methane pressure at flares	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	MPa	m	Continuous	100 %	Electronic and paper	Flares KGUU-5/8 are equipped with the meters of the gas pressure. The relevant data are being recorded daily in the work journal and afterwards combined into the monthly report.
К4	Methane temperature at flares	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	^oC	m	Continuous	100 %	Electronic and paper	Flares KGUU-5/8 equipped with the meters of the gas temperature. Data are being recorded daily in the work journal and afterwards combined into the monthly report.
К5	Methane sent to the gas engines	Department of the chief power	m^3	m	Continuous	100 %	Electronic and paper	

		engineer at the Samsonivska-Zakhidna coal mine						
K6	Pressure of methane being utilized at the gas engines	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	MPa	m	Continuous	100 %	Electronic and paper	The gas engines GE Jenbacher J 420 are equipped by the meters of the gas pressure. Data are being recorded daily in the work journal and afterwards combined into the monthly report.
K7	Temperature of methane being utilized at the gas engines	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	^{o}C	m	Continuous	100 %	Electronic and paper	The gas engines GE Jenbacher J 420 are equipped by the meters of the gas temperature. Data are being recorded daily in the work journal and afterwards combined into the monthly report.
K8	GWP of methane	IPCC	tCO2/ tCH_4	c	Constant value	100 %	Electronic and paper	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national greenhouse gas inventories. (Volume 2 (Energy), 1996)
K9	Methane concentration in the captured gas	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	%	m	Monthly	100 %	Electronic and paper	
K10	Effectiveness of the methane destruction	IPCC	%	e	Constant value	100 %	Electronic and paper	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidlines for national green house gas inventories. (Volume 2 (Energy), 1996)

К11	Carbon emission factor of NMHC	IPCC	tCO_2e/ tNMHC	c	Constant value	100%	Electronic and paper	Annual independent expert report.
К12	Electricity production by the gas engines	Department of the chief power engineer at the Samsonivska-Zakhidna coal mine	MWh	m	Continuous	100 %	Electronic and paper	Annual report
К13	National grid baseline factor (for power savings)	Baseline study for the grid emission factor in Ukraine	tCO_2/ MWh	c	Annually	100 %	Electronic and paper	National grid factor for Ukraine calculated in JI PDD 0018 «Introduction of energy efficiency measures at ISTIL mini steel mill, Ukraine»
К14	NCV of coal	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	kcal/t	m	Monthly	100 %	Electronic and paper	The coal suppliers provide the department of the chief mechanical engineer with certificate which indicates Net Calorific Value (NCV) for each coal batch. If necessary, the qualitative coal characteristics can be inspected by the independent expert.
К15	Electricity consumption from the national grid displaced by the captive power generation in	Department of the chief power engineer at the Samsonivska-Zakhidna coal mine	MWh	m	Continuous	100 %	Electronic and paper	Annual report of the mine.

	the project scenario							
К16	Coal consumption by the heat boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	t	c	Annually	100 %	Electronic and paper	Annual report of the mine.
К17	Heat generation by the heat boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	Gcal	c	Annually	100 %	Electronic and paper	Annual report of the mine.
К18	Proportion of the non-methane hydrocarbon substances in the gas collected	Independent expert	%	c	Annually	100 %	Electronic and paper	The NMHC content in CMM will be controlled by an independent expert. In case of NMHC content in the CMM over 1% of the extracted coal mine gas the respective emissions from NMHC combustion will be included. At the moment of PDD writing no NMHC content over 1% is expected in the extracted CMM.
К19	Methane sent to boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	m^3	m	Continuous	100 %	Electronic and paper	

K20	Pressure of methane being utilized in boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	MPa	m	Continuous	100 %	Electronic and paper	
K21	Temperature of methane being utilized in boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	^{o}C	m	Continuous	100 %	Electronic and paper	

Table 7. Data to be collected in order to monitor emissions from the project.

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 (PE_y) are calculated by the following equation:

$PE_y = PE_{MD} + PE_{UM}$ (D.1.1)

Where:

PE_y – Project emissions in the year *y*, tCO_2e

PE_{MD} – project emissions from CMM destroyed, tCO_2e

PE_{UM} - Project emissions from uncombusted methane, tCO_2e

Emissions from energy use to capture and use methane are not taken into account in the project scenario emissions, since the proposed project measures do not involve any activity with an effect on energy consumption for CMM capture or use compared to the baseline.

The project emissions from methane destroyed are calculated with the formula below:

$PE_{MD} = (MD_{FL} + MD_{ELEC} + MD_{HEAT}) \times (CEF_{CH4} + r \times CEF_{NMHC})$ (D.1.2)

With:

$r = PC_{NMHC} / PC_{CH4}$ (D.1.3)

Where:

PE_{MD} - project emissions from CMM destroyed, tCO_2e

MD_{FL} - project emissions from the methane combustions at flares, tCO_2e

MD_{ELEC} - project emissions from the methane destruction by the gas engines for electricity production, tCO_2e

MD_{HEAT} – project emissions from the methane destruction by boilers for heat production, tCO_2e

CEF_{CH4} - carbon emission factor for combusted methane, 2.75 tCO_2/tCH_4

CEF_{NMHC} - carbon emission factor for combusted non methane hydrocarbons (the concentration varies and, therefore, to be obtained through periodical analysis of captured methane), tCO2/tNMHC

r - Relative proportion of NMHC compared to methane

PC_{NMHC} - NMHC concentration (in mass) in extracted gas, %

PC_{CH4} - concentration (in mass) of methane in extracted gas, %

In each end-use, the amount of gas destroyed depends on the efficiency of combustion of each end use.

1) Project emissions from the methane combustion at flares:

$$MD_{FL} = MM_{FL} \times Eff_{FL} \qquad \text{(D.1.4)}$$

Where:
MD_{FL} - methane destroyed through flaring, tCH_4
MM_{FL} - methane measured sent to flare, tCH_4
Eff_{FL} – efficiency of methane destruction by flares. The minimum flaring efficiency of KGUU 5/8 is 99.9%. For the purpose of calculations the IPCC default flaring efficiency of 99.5% is taken. This is a conservative assumption.

2) Project emissions from the methane destruction by the gas engines:

$$MD_{ELEC} = MM_{ELEC} \times Eff_{ELEC} \qquad \text{(D.1.5)}$$

Where:
MD_{ELEC} - methane destroyed through power generation by the gas engines, tCH_4
MM_{ELEC} - methane measured sent to gas engines, tCH_4
Eff_{ELEC} – efficiency of methane destruction/oxidation by the gas engines. Taken at 99.5% from IPCC.

Note: no heat production by the gas engines is envisaged.

3) Project emissions from the methane destruction by boilers:

$$MD_{HEAT} = MM_{HEAT} \times Eff_{HEAT} \qquad \text{(D.1.6)}$$

Where:
MD_{HEAT} - methane destroyed through heat generation by boilers, tCH_4

$\boldsymbol{MM_{HEAT}}$ - methane measured sent to boilers, tCH_4
$\boldsymbol{Eff_{ELEC}}$ – efficiency of methane destruction/oxidation by the boilers. Taken at 99.5% from IPCC.

4) Project emissions from uncombusted methane:

$$PE_{UM} = GWP_{CH4} \times \sum_i MM_i \times (1 - Eff_i) \qquad \text{(D.1.7)}$$

Where:
$\boldsymbol{PE_{UM}}$ - Project emissions from uncombusted methane, tCO_2
$\boldsymbol{GWP_{CH4}}$ - Global warming potential of methane (21 tCO_2e/tCH_4)
$\boldsymbol{i}$ - Use of methane (power generation, heat generation, flaring)
$\boldsymbol{MM_i}$ - Methane measured sent to use *i*, t CH_4
$\boldsymbol{Eff_i}$ - Efficiency of methane destruction in use *i*, %

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
K1	Methane collected by the degasification system	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	m^3	m	Continuous	100 %	Electronic and paper	
K2	Methane sent to flares	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	m^3	m	Continuous	100 %	Electronic and paper	
K3	Methane pressure at flares	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	MPa	m	Continuous	100 %	Electronic and paper	Flares KGUU-5/8 are equipped with the meters of the gas pressure. Data are being recorded daily in the work journal and afterwards combined into the monthly report.

K4	Methane temperature at flares	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	^{o}C	m	Continuous	100 %	E	Flares KGUU-5/8 are equipped with the meters of the gas temperature. Data are being recorded daily in the work journal and afterwards combined into the monthly report.
K5	Methane sent to the gas engines	Department of the chief power engineer at the Samsonivska-Zakhidna coal mine	m^3	m	Continuous	100 %	Electronic and paper	
K6	Pressure of methane being utilized at the gas engines	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	MPa	m	Continuous	100 %	Electronic and paper	The gas engines GE Jenbacher J 420 are equipped by the meters of the gas pressure. Data are being recorded daily in the work journal and afterwards combined into the monthly report.
K7	Temperature of methane being utilized at the gas engines	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	^{o}C	m	Continuous	100 %	Electronic and paper	The gas engines GE Jenbacher J 420 are equipped by the meters of the gas temperature. Data are being recorded daily in the work journal and afterwards combined into the monthly report.
K8	GWP for methane	IPCC	tCO2/ tCH_4	c	Constant value	100 %	Electronic and paper	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national green house gas inventories. (Volume 2 (Energy), 1996)

K9	Methane concentration in the captured gas	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugillya»	%	m	Monthly	100 %	Electronic and paper	
K10	Effectiveness of the methane destruction	IPCC	%	e	Constant value	100 %	Electronic and paper	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national green house gas inventories. (Volume 2 (Energy), 1996)
K11	Carbon emission factor for NMHC	Independent expert	%	c	Annual	100 %	Electronic and paper	Independent expert report on the CMM composition.
K12	Electricity production by the gas engines	Department of the chief power engineer at the Samsonivska-Zakhidna coal mine	MWh	m	Continuous	100 %	Electronic and paper	Annual report
K13	National grid baseline factor (for power savings)	Baseline study for the grid emission factor in Ukraine	tCO_2/ MWh	c	Annual	100 %	Electronic and paper	National grid factor calculated in JI PDD 0018 «Introduction of energy efficiency measures at ISTIL mini steel mill, Ukraine»

К14	NCV of coal	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	TJ/t	m	monthly	100 %	Electronic and paper	The coal suppliers provide the department of the chief mechanical engineer with certificate which indicates Net Calorific Value (NCV) for each coal batch. If necessary, the qualitative coal characteristics can be inspected by the independent expert.
К15	Electricity consumption from the national grid	Department of the chief power engineer at the Samsonivska-Zakhidna coal mine	MWh	m	Continuous	100 %	Electronic and paper	Annual report of the mine
К16	Coal consumption by the heat boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	t	c	Annual	100 %	Electronic and paper	Annual report of the mine
К17	Heat generation by the heat boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	Gcal	c	Annual	100 %	Electronic and paper	Annual report of the mine

К18	Proportion of the non-methane hydrocarbon substances in the degasification compound	Independent expert	%	m	Annual	100 %	Electronic and paper	Independent expert report on the CMM composition.
К19	Methane sent to boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	m^3	m	Continuous	100 %	Electronic and paper	
К20	Pressure of methane being utilized in boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	MPa	m	Continuous	100 %	Electronic and paper	
К21	Temperature of methane being utilized in boilers	Department of the chief mechanical engineer at the Samsonivska-Zakhidna coal mine	^oC	m	Continuous	100 %	Electronic and paper	

Table 8. Relevant data necessary for determining the baseline for anthropogenic emissions of greenhouse gases by sources within the project boundaries

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

To calculate the baseline emissions for Samsonivska-Zakhidna coal mine project, the following formulae are used:

$$BE_y = BE_{MR,y} + BE_{HEAT,y} + BE_{ELEC,y} \quad \text{(D.1.8)}$$

Where:
BE_y – Baseline emissions in the year y, tCO_2e
$BE_{MR,y}$ - baseline emissions from methane release into the atmosphere in the year *y* that is avoided by the project activity, tCO_2e
$BE_{HEAT,y}$ - baseline emissions from the heat production, replaced by the project activity in the year *y*, t CO_2e
$BE_{ELEC,y}$ - baseline emissions from the electricity consumption from the national grid, replaced by the project activity in the year *y*, t CO_2e

Baseline emissions from methane release into the atmosphere:

$$BE_{MR,y} = GWP_{CH4} \times \sum_i CMM_{PJi.y} \quad \text{(D.1.9)}$$

Where:
$BE_{MR,y}$ - baseline emissions from methane release into the atmosphere in the year *y* that is avoided by the project activity, tCO_2e
GWP_{CH4} – global warming potential for methane, 21 tCO_2e/tCH_4
i – use of methane (flaring, power generation, heat generation)
$CMM_{PJi,y}$ – CMM captured, sent to and destroyed by use *i* in the project activity in year *y*, tCH_4.

The total emissions from heat generation in the baseline is given by the following equation:

$$BE_{HEAT,y} = COAL_{HEAT,y} \times NCV_{COAL,y} \times OXID_{COAL} \times EF_{COAL} \quad \text{(D.1.10)}$$

Where:
$BE_{HEAT,y}$ - potential total baseline emissions from the production of heat replaced by the project activity in year *y*, tCO_2e
$COAL_{HEAT,y}$ – amount of coal consumed for heat generation in year *y*, t. Note: the boilers of Samsonivska-Zakhidna mine can only use coal for heat production in the baseline scenario (no switch from coal to CMM is done)
$NCV_{COAL,y}$ – average net calorific value of coal in year *y*, TJ/t

$OXID_{COAL}$ – oxidation efficiency of combustion for coal, sourced from IPCC, %
EF_{COAL} - emission factor for coal, tCO2/TJ

The total emissions from power consumption in the baseline is given by the following equation:

$$BE_{ELEC,y} = GEN_y \times EF_{ELEC} \qquad \text{(D.1.11)}$$

Where:
$BE_{ELEC,y}$ - potential total baseline emissions from the consumption of power replaced by the project activity in year *y*, tCO_2e
GEN_y - electricity generated by project activity in year *y*, MWh
EF_{ELEC} - emission factor of captive electricity replaced by project, tCO2/MWh

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

Not applicable

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

Not applicable

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:

According to ACM0008 methodology the following leakages have to be scrutinized:

- Displacement of baseline thermal energy uses
- CBM drainage from outside the destressed zone
- Impact of the JI project on coal production
- Impact of the JI project on coal prices

There are no leakages since:

1. No CMM to be used for thermal demand under the baseline scenario. Therefore, no leakages are expected for displacement of baseline thermal energy uses;
2. There is no CBM used throughout the project operation. Hence, no leakages occur from CDM drainage from outside the destressed zone
3. As degasification activities occur independently from the JI project activity, there will be no effect on the coal production.
4. It is almost impossible to estimate an impact of the JI project on coal prices. Since the project activity does not affect the volumes of coal production at the Samsonivska-Zakhidna mine, the coal price changes due to the JI project implementation are not foreseen.

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

No leakages expected.

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

No leakages 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 CO_2 equivalent):

The greenhouse gas emission reductions that the project activities result in are calculated in accordance with the following formulae:

$$ER_y = BE_y - PE_y - LE_y \quad \text{(D.1.12)}$$

Where:
BE_y – baseline emissions over the year y, tCO_2/year;
PE_y – project emissions over the year y, tCO_2/year;
LE_y – leakages over the year y, tCO_2e. Please note that LEy = 0

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:

An adequate quality control and assurance procedures to maintain a consistent and reliable performance of the automatic controlling and monitoring system are to be implemented in accordance with the existing national calibration standards and quality norms. Regular maintenance and testing regime to ensure accuracy of flow meters, gas-analysers, electricity and heat measuring instruments will be provided, as required by the national standards. All measuring equipment will be calibrated periodically. The calibration protocols will be archived and proved by an independent entity on the annual basis. A consistency check for all measurement data and the calculation of the emission reductions will be carried out and reported monthly. Detailed data on the collection and archiving of information on the environmental impacts is given in the table below.

#	Emission source	Data collected	Responsible unit	Reported to	Measurements frequency	How the data is archived
1.	Atmospheric emissions of the degassing system of	CH4	Department of the preventive measures and safety (DPMS)	Regional department for environmental protection, regional	DPMS makes continuous measurements once in	DPMS keeps paper records at least for three years. Reports on

	the mine		OJSC«Krasnodonvugil lya», Environmental specialist of the Samsonivska-Zakhidna mine	inspection on the environmental protection	every two hours. “Pryroda” company makes control measurements once a year. Emissions inventory is prepared once in five years.	the control measurements and inventories are kept for five years.
2.	Atmospheric emissions from the ventilation system	CH4, coal dust	Department of ventilation and safety (DVS), Environmental specialist of the Samsonivska-Zakhidna mine	Regional department for environmental protection, regional inspection on the environmental protection	DVS makes continuous measurements once in every two hours. “Pryroda” company makes control measurements once a year. Emissions inventory is prepared once in five years.	DVS keeps paper records at least for three years. Reports on the control measurements and inventories are kept for five years.
3.	KE-10/14 and KVTS-20-150 boilers	Emissions of methane, carbon monoxide, carbon dioxide, nitrogen dioxide, nitrous oxide, sulphur dioxide, ash, heavy metals (arsenic, copper, chrome, nickel, mercury, lead, zinc)	Department of the chief mechanical engineer, Environmental specialist of the Samsonivska-Zakhidna mine	Regional department for environmental protection, regional inspection on the environmental protection	“Pryroda” company makes control measurements once a year. Emissions inventory is prepared once in five years.	Reports on the control measurements and inventories are kept for five years.
4.	KGUU-5/8	Methane combustion products	Department of the preventive measures and safety (DPMS) OJSC«Krasnodonvugil lya», Environmental	Regional department for environmental protection, regional inspection on the environmental	DPMS makes continuous measurements once in every two hours.	DPMS keeps paper records at least for three years.

			specialist of the Samsonivska-Zakhidna mine	protection		

Table 9. Collection and archiving of information on the environmental impacts

According to the current legislation, the environmental impact assessment (EIA) has to be undertaken before the permit for the gas engines and flares installation is issued by the state authorities. The Environmental Impact Assessment is to be performed in accordance with the following regulations:

- DBN A.2.2.1-2003 'Composition and content of the environmental impact assessment (EIA) documents for designing of the plants, buildings and structures'
- DBN A.2.2-3-2004 'Construction design composition and rules for its development, endorsement and approval'
- The Law of Ukraine 'On the environmental expertise'

The EIA is expected to be prepared in due course before the state permit for operating the flares and gas engines is issued. Please refer to Section F for more information regarding the environmental impacts.

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.
К1	Low	The methane collected by the degasification system is being controlled by the RP-160 (2 control points) and KSD-2 (2 control points) equipment. The Department of installation, dismantling and coal mine equipment maintenance of the OJSC "Krasnodonvugillya" ensures the equipment calibration once per year. The department has been licensed to provide services on the equipment calibration and adjustment.
К2	Low	The flares KGUU-5/8 are equipped with the automatic system monitoring operational parameters, including the volumes of combusted methane. The system calibration is being provided once per year by the Department of installation, dismantling and coal mine equipment maintenance of the OJSC

		"Krasnodonvugillya", having a proper licence.
К5	Low	The gas engines GE Jenbacher J 420 are equipped with the automatic system, monitoring operational parameters, including the volumes of combusted methane. The system calibration is being provided once per year by the Department of installation, dismantling and coal mine equipment maintenance of the OJSC "Krasnodonvugillya", having a proper licence.
К9	Low	The methane concentration in the captured gas is measured by four Gamma-1000 meters . The meter calibration is being provided once per year by the Department of installation, dismantling and coal mine equipment maintenance of the OJSC "Krasnodonvugillya", having a proper licence
К12	Low	The gas engines GE Jenbacher J 420 are equipped with the automatic system, monitoring operational parameters, including electricity production. The system calibration is being provided once per year by the Department of installation, dismantling and coal mine equipment maintenance of the OJSC "Krasnodonvugillya", having a proper licence.
К11	Low	The coal supplier provides the certificate with Net Calorific Value (NCV) indicated for each coal batch. If necessary, the qualitative characteristics of the coal batch can be inspected by the independent expert.
К15	Low	The electricity consumption from the national grid is being measured by four commercial meters EPQS installed on the substation of the Samsonivska-Zakhidna coal mine. The professional employees of the holding company "Krasnodonvugillya" ensure the meter calibrations once for six months. The meters have to be inspected by the state authorities once per six years.

K16	Low	The coal suppliers provide the certificate which indicates coal weight for each coal batch.

Table 10. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored

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

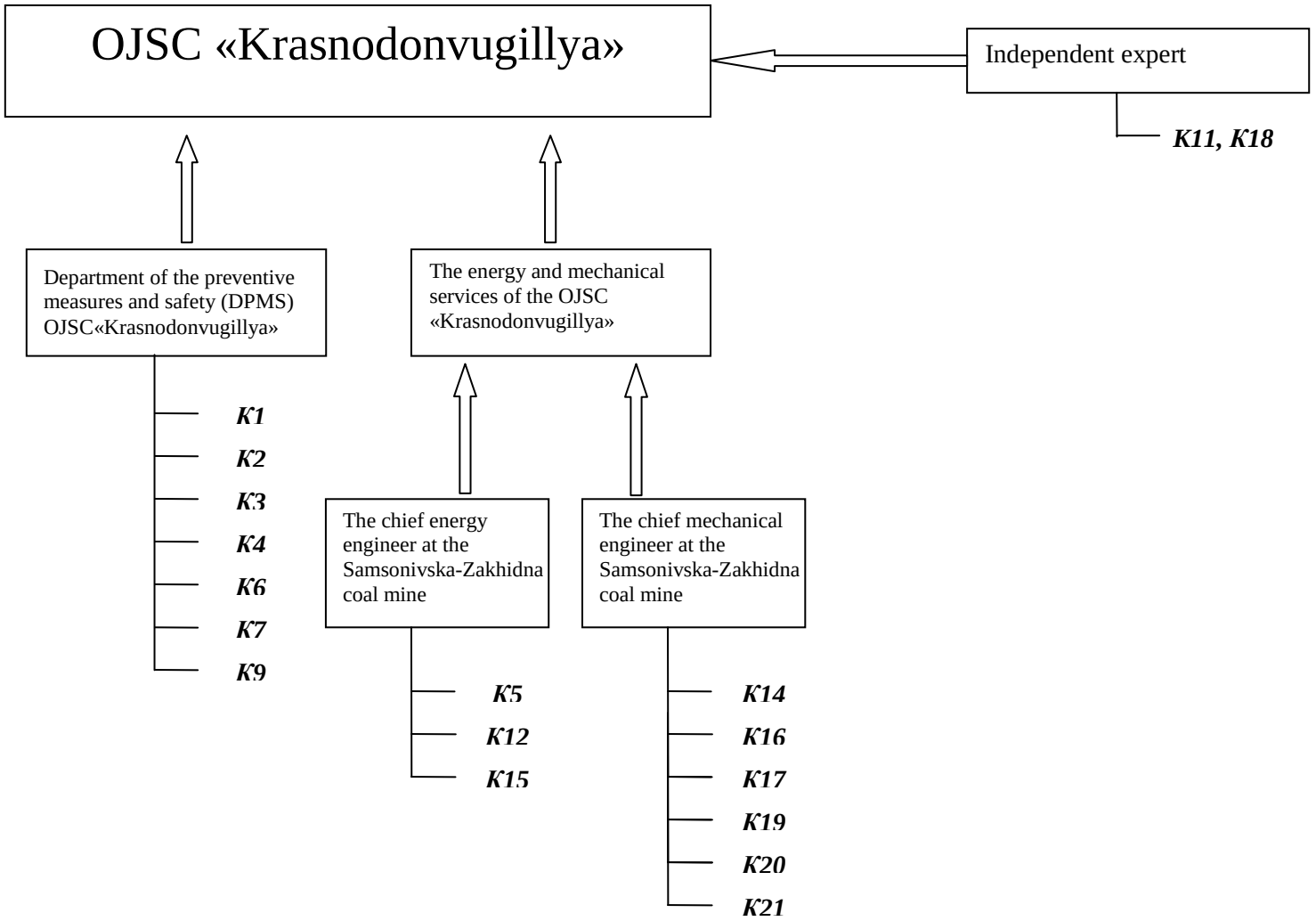

Figure 5. The operational and management structure that the project operator will apply implementing the monitoring plan

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

- OJSC “Krasnodonvugillya”
- «GreenStream Network GmbH»

Section E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

The following calculations are based on the baseline determined in the section B and formulae presented in the Section D. The volume of CMM flared at KGUU-5/8 units and used as fuel for boilers and gas engines would otherwise be released into the atmosphere. The heat generated with the use of CMM as fuel would otherwise be produced with the use of coal. The electricity produced by the gas engines using CMM as fuel would otherwise be consumed from the grid, therefore leading indirectly to the fuel combustion by the grid power plants.

The following assumptions were used to calculate the project and baseline scenario emissions:

1) Only CO2 emissions from fuel combustion are included into the calculations; emissions of other greenhouse gases (e.g. methane, N2O) originating from combustion were excluded from the calculations. This is a conservative assumption.
2) The amount of the methane released into the atmosphere was calculated using the default IPCC factor. This is a conservative assumption.
3) In accordance with the methodology chosen, the manufacturer's data regarding the efficiency of boilers and gas engines was used in the calculations. This is a conservative assumption.

Emissions under the project scenario			2009	2010	2011	2012
1	Emissions under the project scenario	tCO_2/year	48206	59912	34560	34560
2	Total for 2009–2012 period	tCO_2	**177 238**			

Emissions under the project scenario after 2012			2013	2014	2015	2016	2017	2018
1	Emissions under the project scenario	tCO_2/year	34560	34560	34560	34560	30170	18464
2	Total for 2013–2018 period	tCO_2	**186 876**					

Table 11. Estimated project emissions

Estimation of GHG emissions for each source for project scenario presented below (Table 12)

#	**Source**	**2009**	**2010**	**2011**	**2012**
1	CMM captured by degassing system and vented to the atmosphere	300 492	214 384	78 574	78 574
3	Captive generation of electricity with the use of CMM at the Samsonivska-Zakhidna mine	32 353	32 353	0	0

4	Coal consumed by boilers at the Samsonivska-Zakhidna mine	11 463	11 463	0	0
6	Emissions related to the CMM combustion by flares	4 229	15 505	16 914	16 914
7	Emissions related to the CMM combustion by boilers	0	0	5 809	5 809
8	Emissions related to the CMM combustion by gas engines	0	0	10 566	10 566
9	Emissions from NMHC destruction	0	0	0	0
10	Fugitive emissions of unburned methane	161	592	1 271	1 271

#	Source	2013	2014	2015	2016	2017	2018
1	CMM captured by degassing system and vented to the atmosphere	78 574	78 574	78 574	78 574	110 864	196 973
3	Captive generation of electricity with the use of CMM at the Samsonivska-Zakhidna mine	0	0	0	0	0	0
4	Coal consumed by boilers at the Samsonivska-Zakhidna mine	0	0	0	0	0	0
6	Emissions related to the CMM combustion by flares	16 914	16 914	16 914	16 914	12 686	1 410
7	Emissions related to the CMM combustion by boilers	5 809	5 809	5 809	5 809	5 809	5 809
8	Emissions related to the CMM combustion by gas engines	10 566	10 566	10 566	10 566	10 566	10 566
9	Emissions from NMHC destruction	0	0	0	0	0	0
10	Fugitive emissions of unburned methane	1 271	1 271	1 271	1 271	1 110	679

Table 12. Estimated GHG emissions for each source for project scenario

E.2. Estimated leakage:

0

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

Project emissions + Leakage = 177 238 + 0 = 177 238 tCO_2.

After 2012:

Project emissions + Leakage = 186 876 + 0 = 186 876 tCO_2.

E.4. Estimated baseline emissions:

The following calculations are based on the baseline determined in the section B and formulae presented in the Section D. The volume of CMM flared at KGUU-5/8 units and used as fuel for boilers and gas engines would otherwise be released into the atmosphere. The heat generated with the use of CMM as fuel would otherwise be produced with the use of coal. The electricity produced by the gas engines using CMM as fuel would otherwise be consumed from the grid, therefore leading indirectly to the fuel combustion by the grid power plants.

The following assumptions were used to calculate the project and baseline scenario emissions:

1) Only CO2 emissions from fuel combustion are included into the calculations; emissions of other greenhouse gases (e.g. methane, N2O) originating from combustion were excluded from the calculations. This is a conservative assumption.
2) Emissions from transporting the coal used by the boilers for heat production are not taken into account. This is a conservative assumption.
3) Emissions from transporting the methane within the degassing system to the flares, boilers and CHPs are not taken into account, because these emissions do not change in the project scenario compared to the baseline. This is a conservative approach.
4) The historical average NCV of the coal used by the boilers for heat production, that is below the IPCC value, was used. This is a conservative assumption.
5) The amount of the methane released into the atmosphere was calculated using the default IPCC factor. This is a conservative assumption.
6) In accordance with the methodology chosen, the manufacturer's data regarding the efficiency of boilers and gas engines was used in the calculations. This is a conservative assumption.

Emissions under the baseline scenario			2009	2010	2011	2012
1	Emissions under the baseline scenario	tCO_2/year	76106	162215	298025	298025
2	Total for 2009-2012 period	tCO_2	**834 370**			

Emissions under the baseline scenario after 2012			2013	2014	2015	2016	2017	2018
1	Emissions under the baseline scenario	tCO_2/year	298025	298025	298025	298025	265734	179626
2	Total for 2013–2018 period	tCO_2	**1 637 459**					

Table 13. Estimated baseline emissions

Estimation of GHG emissions for each source for baseline scenario presented below (Table 14)

#	**Source**	**2009**	**2010**	**2011**	**2012**
1	CMM captured by degassing system and vented to the atmosphere	332 783	332 783	332 783	332 783

3	Captive generation of electricity with the use of CMM at the Samsonivska-Zakhidna mine	32 353	32 353	32 353	32 353
4	Coal consumed by boilers at the Samsonivska-Zakhidna mine	11 463	11 463	11 463	11 463
6	Emissions related to the CMM combustion by flares	0	0	0	0
7	Emissions related to the CMM combustion by boilers	0	0	0	0
8	Emissions related to the CMM combustion by gas engines	0	0	0	0
9	Emissions from NMHC destruction	0	0	0	0
10	Fugitive emissions of unburned methane	0	0	0	0

#	Source	2013	2014	2015	2016	2017	2018
1	CMM captured by degassing system and vented to the atmosphere	332 783	332 783	332 783	332 783	332 783	332 783
3	Captive generation of electricity with the use of CMM at the Samsonivska-Zakhidna mine	32 353	32 353	32 353	32 353	32 353	32 353
4	Coal consumed by boilers at the Samsonivska-Zakhidna mine	11 463	11 463	11 463	11 463	11 463	11 463
6	Emissions related to the CMM combustion by flares	0	0	0	0	0	0
7	Emissions related to the CMM combustion by boilers	0	0	0	0	0	0
8	Emissions related to the CMM combustion by gas engines	0	0	0	0	0	0
9	Emissions from NMHC destruction	0	0	0	0	0	0
10	Fugitive emissions of unburned methane	0	0	0	0	0	0

Table 14. Estimated GHG emissions for each source for baseline scenario

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

Emission reductions of the project = Baseline emissions – (Project emissions + Leakage) = 834 370 tCO_2 – 177 238 tCO_2 = 657 132 tCO_2

Emission reductions of the project after 2012 = Baseline emissions – (Project emissions + Leakage) = 1 637 459 tCO_2 – 186 876 tCO_2 = 1 450 584 tCO_2

Emission reductions			2009	2010	2011	2012
1	Total	tCO_2/year	27 901	102 302	263 464	263 464
2	Total for 2009–2012 period	tCO_2	**657 132**			

Emission reductions after 2012			2013	2014	2015	2016	2017	2018
1	Total	tCO_2/year	263 464	263 464	263 464	263 464	235 564	161 162
2	Total for 2013–2018 period	tCO_2	**1 450 584**					

Table 15. Project emission reductions

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

Year	Estimated project emissions (tCO_2e)	Estimated leakage (tCO_2e)	Estimated baseline emissions (tCO_2e)	Estimated emission reductions (tCO_2e)
2009	48206	0	76106	27 901
2010	59912	0	162215	102 302
2011	34560	0	298025	263 464
2012	34560	0	298025	263 464
Total, 2009-2012 (tCO_2e)	**177 238**	**0**	**834 370**	**657 132**

After 2012:

Year	Estimated project emissions (tCO_2e)	Estimated leakage (tCO_2e)	Estimated baseline emissions (tCO_2e)	Estimated emission reductions (tCO_2e)
2013	34560	0	298025	263 464
2014	34560	0	298025	263 464
2015	34560	0	298025	263 464
2016	34560	0	298025	263 464
2017	30170	0	265734	235 564
2018	18464	0	179626	161 162
Total, 2013-2018 (tCO_2e)	**186 876**	**0**	**1 637 459**	**1 450 584**

Table 16. Emissions under baseline and project scenario, as well as 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:

The project "Coal mine methane capture and utilization at Samsonivska-Zakhidna mine" aims at improving the regional environmental, social and economic situation. The following advantages are to be obtained throughout the project implementation:

1) Due to the technologies installation for the coal mine methane utilization, Samsonivska-Zakhidna mine is to decrease methane release to the atmosphere, therefore eliminating a source of greenhouse gas emissions to the atmosphere.

2) The project implementation is to contribute to diminishing of the Ukraine's dependency from the imported energy resources, for instance, from expensive natural gas.

3) The coal mine methane usage for electricity generation results in a numbers of benefits for the environment compared to widely spread fossil fuel combustion. The company, therefore, can rely on its own energy resources, being constantly renewed while the coal mine is operational.

4) The project employs the enabling technology, which is to reduce electricity consumption from the national grid by 36 108 MWh per year during the 2011-2018 period.

According to the current legislation, the environmental impact assessment (EIA) has to be undertaken before the permit for the gas engines and flares installation is issued by the state authorities. The Environmental Impact Assessment is to be performed in accordance with the following regulations:

- DBN A.2.2.1-2003 'Composition and content of the environmental impact assessment (EIA) documents for designing of the plants, buildings and structures'
- DBN A.2.2-3-2004 'Construction design composition and rules for its development, endorsement and approval'
- The Law of Ukraine 'On the environmental expertise'

The EIA is expected to be prepared in due course before the state permit for operating the flares and gas engines is issued. As of 2009, the first KGUU-5/8 unit is operating in the testing mode with a temporary state permit issued as of September 14th, 2009. The fuel switch at the mine's boilers does not create any new emission sources, and in fact is decreasing hazardous emissions to the atmosphere. According to the existing national regulations, no EIA procedure is required for the fuel switch activities at the existing boilers of Samsonivska-Zakhidna.

Moreover, in accordance with the Ukraine's legislation, the coal mines are obliged to report on the emissions of hazardous substances, such as sulphur dioxide, nitrogen dioxide, carbon monoxide, dust emissions, etc. Samsonivska-Zakhidna mine has received all relevant permits issued by the State Department of Environmental Protection in Luhansk Oblast. The permits are valid until 2014.

Ukraine has ratified three Protocols to the UN Convention on Long-range Transboundary Air Pollution. Two of these Protocols are directly related to the reduction and control over the hazardous substances emissions, namely:

- The 1985 Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent, entered into force as of September 2nd, 1987.
- The 1988 Sofia Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes, entered into force as of February 14th, 1991.

The use of degassing CMM as fuel will significantly decrease emissions of uncombusted methane from the Samsonivska-Zakhidna mine and possible transboundary transfer of such methane emissions. In addition, the proposed project will lead to decrease of the coal consumption by the boilers of the Samsonivska-Zakhidna mine and the subsequent decrease of the atmospheric emissions of hazardous substances (such as nitrogen and sulphur oxides). The proposed project activity is in line with the existing international treaties on transboundary pollution. Detailed information on the quantitative change in the hazardous substances emissions from Samsonivska-Zakhidna mine will be available in the Environmental Impact Assessment. The 'Pryroda' company has been commissioned to perform the Environmental Impact Assessment of the proposed project. The expected time of the EIA completion is July 2010.

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:

The reconstruction of boilers KE-10/14 and KVTS-20-150 with further fuel switch to coal mine methane will not result in an increase of the hazardous emissions to the atmosphere. The boilers reconstruction also foresees no new equipment installation. Therefore, as there are no legally binding requirements in the Ukraine's legislation, the EIA for these project activities will not be conducted.

Three flares KGUU-5/8 and three gas engines GE Jenbacher J 420 installation needs to be firstly issued with the official permit by the state authorities. Under the current Ukraine's legislation, the EIA of these project activities will be applied.

SECTION G. Stakeholders' comments

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

On the stage of the project design documentation development, all relevant information on the project was provided to the Krasnodon City Council. The received answer enclosed in Annex 4.

Annex 1
CONTACT INFORMATION ON PROJECT PARTICIPANTS

Project owner:

Organization:	OJSC “Krasnodonvugillya”
Street/P.O.Box:	Komsomolska St.
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URL	
Represented by:	
Title:	General Director
Salutation:	Mr.
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Middle name:	Oleksiiovych
First name:	Oleksandr
Department:	
Fax (direct):	
Phone (direct):	
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Personal e-mail:	Aleksandr.Potapenko@krasnodoncoal.com

Project partner, Carbon advisor:

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Fax:	+31 20 565 82 07
URL	www.ing.com/carboncredits
Represented by:	Peter van Eijndhoven
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Project developer:

Organization:	GreenStream Network GmbH
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URL	http://www.greenstream.net
Represented by:	
Title:	
Salutation:	Mr.
Last name:	Groza
Middle name:	Georgiiovych
First name:	Yevgen
Department:	
Fax (direct):	
Phone (direct):	
Mobile:	
Personal e-mail:	yevgen.groza@greenstream.net

Annex 2

BASELINE INFORMATION

The key elements of the baseline are provided below in the tabular form.

Data / Parameter:	$CMM_{BL,i}$
Data unit:	tCH_4
Description:	CMM that would have been captured, used and destroyed by use *i* in the baseline scenario in year *y*
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Defined in Section D.1
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	CEF_{ELEC}
Data unit:	tCO_2/MWh
Description:	Carbon emission factor for the power savings in the Ukrainian grid
Time of determination/monitoring	
Source of data (to be) used	JI project 0018 "Introduction of energy efficiency measures at ISTIL mini steel mill"
Value of data applied (for ex ante calculations/determinations)	0.896
Justification of the choice of data or description of measurement methods and procedures (to be) applied	JI project 0018 "Introduction of energy efficiency measures at ISTIL mini steel mill". The grid factor will be updated in case an updated grid factor for Ukraine is developed.
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	CEF_{COAL}
Data unit:	tCO_2/GJ
Description:	Carbon emission factor for coal
Time of determination/monitoring	
Source of data (to be) used	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national greenhouse gas inventories. (Volume 2 (Energy), 1996), Section 1.2.1, Table 1-2
Value of data applied (for ex ante calculations/determinations)	0.0983

Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	MM_{FL}
Data unit:	tCH_4
Description:	Methane measured sent to flares
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Defined in Section D.1
QA/QC procedures (to be) applied	
Any comment:	Flow meters will record gas volumes, pressure and temperature.

Data / Parameter:	MM_{ELEC}
Data unit:	tCH_4
Description:	Methane measured sent to gas engines
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Defined in Section D.1
QA/QC procedures (to be) applied	
Any comment:	Flow meters will record gas volumes, pressure and temperature.

Data / Parameter:	MM_{HEAT}
Data unit:	tCH_4
Description:	Methane measured sent to boilers
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of	Defined in Section D.1

measurement methods and procedures (to be) applied	
QA/QC procedures (to be) applied	
Any comment:	Flow meters will record gas volumes, pressure and temperature.

Data / Parameter:	Eff_{ELEC}
Data unit:	%
Description:	Efficiency of methane destruction/oxidation in the gas engines
Time of determination/monitoring	
Source of data (to be) used	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national greenhouse gas inventories. (Volume 2 (Energy), 1996), Section 1.2.1, Table 1-4
Value of data applied (for ex ante calculations/determinations)	99.5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	Eff_{HEAT}
Data unit:	%
Description:	Efficiency of methane destruction/oxidation by boilers
Time of determination/monitoring	
Source of data (to be) used	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national greenhouse gas inventories. (Volume 2 (Energy), 1996), Section 1.2.1, Table 1-4
Value of data applied (for ex ante calculations/determinations)	99.5
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	Eff_{FL}
Data unit:	%
Description:	Efficiency of methane destruction/oxidation by flares
Time of determination/monitoring	
Source of data (to be) used	IPCC data provided in the Chapter 2 of the Revised 1996 IPCC Guidelines for national greenhouse gas inventories. (Volume 2 (Energy), 1996), Section 1.2.1, Table 1-4
Value of data applied (for ex	99.5

ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This is a conservative assumption
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	CEF_{NMHC}
Data unit:	$tCO_2/tNMHC$
Description:	Carbon emission factor for combusted non methane hydrocarbons (various)
Time of determination/monitoring	
Source of data (to be) used	Independent expert
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	To be obtained through periodical analysis of the fractional composition of captured gas

Data / Parameter:	PC_{CH4}
Data unit:	%
Description:	Concentration (in mass) of methane in extracted gas, measured on wet basis
Time of determination/monitoring	
Source of data (to be) used	Samsonivska-Zakhidna mine
Value of data applied (for ex ante calculations/determinations)	35
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Based on historical data
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	PC_{NMHC}
Data unit:	%
Description:	Concentration (in mass) of NMHC in extracted gas
Time of determination/monitoring	

Source of data (to be) used	Independent expert
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential of methane
Time of determination/monitoring	
Source of data (to be) used	Decision FCCC/CP/1999/7, page 14
Value of data applied (for ex ante calculations/determinations)	21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Data / Parameter:	CEF_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Carbon emission factor for combusted methane
Time of determination/monitoring	
Source of data (to be) used	ACM0008 methodology (version 06).
Value of data applied (for ex ante calculations/determinations)	44/16 = 2.75
Justification of the choice of data or description of measurement methods and procedures (to be) applied	In accordance with the ACM0008 methodology (version 06).
QA/QC procedures (to be) applied	
Any comment:	

Annex 3

MONITORING PLAN

Monitoring plan can be found in the Section D.

Annex 4

The stakeholder's feedback (letter)

From 22.10.2009

To the General Director

of OJSC "Krasnodonvugillya"

O.O. Potapenko

Dear Oleksandr Oleksiiovych,

I got acquainted with the proposed project of coal mine methane capture and utilization at Samsonivska-Zakhidna mine, which consists of the following measures: installation of flares, reconstruction of the coal-fired boilers with further fuel switch to coal mine methane, and installation of the gas engines, operating on coal mine methane.

The proposed Joint Implementation project on coal mine methane capture and utilization at Samsonivska-Zakhidna mine is economically and socially important and has positive impact on the environment. The financing of the project will become essential investment into the coal mine industry in Krasnodon. The JI project will result in coal and energy savings, create new employment opportunities, improve safety, and secure the work place availability in the long term prospective.

The JI mechanism implementation in accordance with the Kyoto Protocol will assist OJSC Krasnodonvugillya in attracting significant additional investments into Samsonivska-Zakhidna mine modernization. The project implementation will result in greenhouse gases reduction, in particular CO_2.

Krasnodon Regional State Administration supports the proposed project of coal mine methane capture and utilization at Samsonivska-Zakhidna mine and asks for your assistance in participation of the enterprise in JI mechanism to ensure the project implementation.

First Deputy

Acting Head of the Regional State Administration R.V. Khorunzhyi