MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

CONTENTS

* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).
There is no mandatory JI MR template, therefore CDM MR template was used.

MONITORING REPORT
version #3, 20/04/2012

"WASTE HEAP DISMANTLING IN LUHANSK REGION OF UKRAINE WITH THE AIM OF REDUCTION GREENHOUSE GASES EMISSIONS TO ATMOSPHERE"

Monitoring period #1:

Monitoring period starting date: 01/06/2008
Monitoring period closing date: 31/12/2011

SECTION A. General description of the project activity

A.1. Brief description of the project activity:

1. Purpose of the project activity and the measures taken to reduce greenhouse gas emissions;

The main idea of the project is to process waste heaps originated due to coal extraction from mines. Coal extraction from the mine's waste heap will prevent greenhouse gas emissions into the atmosphere as if in the case of spontaneous burning and will produce additional amount of coal instead of its mining. Emission reductions due to the implementation of this project will come from three major sources:

- Removing the source of green-house gas emissions from the burning / slow burning waste heap by the extraction of non-combusted coal contained in a waste heap;
- Negative leakage through reduced fugitive emissions of methane due to the replacement of coal that would have been mined, by the coal extracted from the heap under the project activity.
- Reduce electricity consumption at waste heap dismantling in comparison with energy consumption at coal mine.

This Project is aimed at coal extraction from the mine's waste heaps near the Kodruche village, Sverdlovsk district, Luhansk Region, Ukraine. These waste heaps have been accumulated some time before the start of the project activity from the mining waste of underground mines. Project activity will prevent greenhouse gas emissions into the atmosphere during combustion of the heaps and will contribute an additional amount of coal, without the need for mining.

In the baseline scenario it is assumed that this common practice will continue and waste heaps will be burning and emitting GHG into the atmosphere until the coal is consumed. Whereas using improved extraction techniques, proposed in this project, the residual coal can be extracted from the waste heaps and the coal can be used to for the energy needs of local consumers. The reclaimed coal will replace coal that would have otherwise been mined, causing fugitive emissions of methane during the mining process.

Thus, **the baseline scenario** is the continuation of the current situation, which is the continuation of the situation before the project was installed, without beneficiation plant and waste heap dismantling.

In the **project scenario** the coal extracted from the waste heaps will partly substitute the coal from the mine, decreasing fugitive methane emissions, and reduce emissions GHG emissions due to waste heap combustion by extracting all of the combustible material from the waste heaps.

2. Brief description of the installed technology and equipments

Special beneficiant plant "Allair-jig plant", which is delivered by the company Ukrainische Industrie Gruppe GmbH & Inc (Berlin, Germany). The advantages of jigging process are combined with advantages of dry beneficiation processes; e.g. no need for process water, clarified water or water purification, no fines dewatering no slurry impoundment. Separating of minerals in jigging machines is based on the fact, that particles stratify in pulsating air. The upward and downward currents fluidize and

compact the grains into relatively homogenous layers. Low density pieces stratify on the surface, while specifically heavy grains settle to the lower level of the bed. The most precise stratification of particles requires that the frequency and amplitude of the pulsation – which may be adjusted during operation – were optimized according to feed characteristics.

The facility is fully automatic. The concentration facility is duly equipped with safety interlocks, alarms, emergency shut-off and operation sensors.

3. Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.).

The project has been initiated in the start of 2005. 15th of January 2006 is the date of signing the purchase contract the main equipment. Installation and construction works were initiated by the end of 2007. 31st of May 2008 is the date of commissioning of the equipment .The operations at the facility have started on the 31st of May 2008. The JI was one of the drivers for the project from the start and financial benefits provided by the JI mechanism were considered as one of the reasons to start the project and are crucial in the decision to start the operations.

4. Total emission reductions achieved in this monitoring period.

Total amount of emission reductions achieved from 01/06/2008 to 31/12/2011, rounded down to whole tonnes, is **744585** tons of CO_2e.

A.2. Project Participants

Small Private Enterprise «BIK» is the project host.

Party involved *	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (Host party)	Small Private Enterprise «BIK»	No
The Netherlands	Ohana LLP	No

A letter of endorsement from the Ukrainian Designated Focal Point had previously been received for the proposed project, reference No. 746/23/7, dated 22/03/2012.
A letter of approval from the Ukrainian Designated Focal Point was received for the proposed project, reference No. 1076/23/7, dated 24/04/2012.

A letter of approval from the Netherland Designated Focal Point was received for the proposed project, reference 2012JI11, dated 17/04/2012.

A.3. Location of the project activity:

The project is located near the Kodruche village, Sverdlovsk district, Luhansk Region, Ukraine.

The project boundary includes waste heap the mine number 70 (former skating factory), beneficiation complex with special machinery. The geographic coordinates of the site are: 48° 1′ 35.04″ N, 39° 37′ 46.92″ E[1].

A.4. Technical description of the project

This Project is aimed at coal extraction from the mine's waste heaps near the Kodruche village, Sverdlovsk district, Luhansk Region, Ukraine. These waste heaps have been accumulated some time before the start of the project activity from the mining waste of underground mines. Project activity will prevent greenhouse gas emissions into the atmosphere during combustion of the heaps and will contribute an additional amount of coal, without the need for mining.

The Project envisages high-grade anthracite production for the needs of households and energy sector.

This beneficiation allair – jig plant was invented for the dry upgrading of coal. The advantages of jigging process are combined with advantages of dry beneficiation processes; e.g. no need for process water, clarified water or water purification, no fines dewatering no slurry impoundment.

Separating of minerals in jigging machines is based on the fact, that particles will stratify in pulsating air. The upward and downward currents fluidize and compact the grains into relatively homogenous layers. Low density pieces stratify on the surface, while specifically heavy grains settle to the lower level of the bed. The most precise stratification of particles requires, that the frequency and amplitude of the pulsation – which may be adjusted during operation – were be optimized according to feed characteristics. Machines are air-pulsed and driven by vibrating motors. After stratification the discharge of heavy product is done by a stargate discharge system, which is controlled by density measuring device and this allows enrich the material effectively.

The dry beneficiation of hard coal and lignite is performed by Allair-jig plant, which gives the possibility to reduce the ash and sulfur content without having to use traditional wet separation processes.

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1 *http://toolserver.org/~geohack/geohack.php?language=uk&pagename=%D0%A1%D0%B2%D0%B5%D1%80%D0%B4%D0%BB%D0%BE%D0%B2%D1%81%D0%BA_&params=48.0264_N_39.6297_E_scale:30000*

Fig.1 Beneficiation plant.

Allair-jig plant offers the following advantages regarding the beneficiation of coal:
• efficient, automatic refuse removal
• improve product quality consistently
• no slurry handling
• no slurry disposal
• no process water requirements
• obtaining coal from low value not beneficiation coal
• plant is transportable therefore reduce raw coal transportation
• reduce ash without increasing moisture
• reduce pyrites (S) and mercury (Hg)

The Allair-jig plant[2] uses the principles of jigging which are also the basis for the design and operation of conventional wet jigs. The structural scheme of work of Allair-jig plant is presented in fig. 6. Run-of-mine coal consists of particles of comparable sizes but different densities. Stratification according to the particle density can be obtained by eliminating particle friction and allowing the particles to be sorted according to the specific particle density. In conventional wet jigs this stratification is obtained by feeding the material across a screen and pulsating water upward and downward.

Used equipment is designed and made in Germany, works on the principle of dry enrichment method of pneumatic settlement, ensuring high efficiency of separation of coal from the rocks:

1 - Completely dry method of air beneficiation with high efficiency and low humidity preservation of the finished product;
2 - Controlled deep coal beneficiation, that allows to provide quality product with attachment to the desire of a buyer;
3 - Ability to beneficiate of any material, with a capacity of coal;
4 - Ability to obtain the fractional composition of the coal product in the range of 0 to 50 mm;
5 - Completely automatic control and quality control from the load system to a finished product;
6 - The process complies with environmental standards Euro 4.

[2] *http://www.allmineral.com/gb/download/Newsletter_gb_0405.pdf*

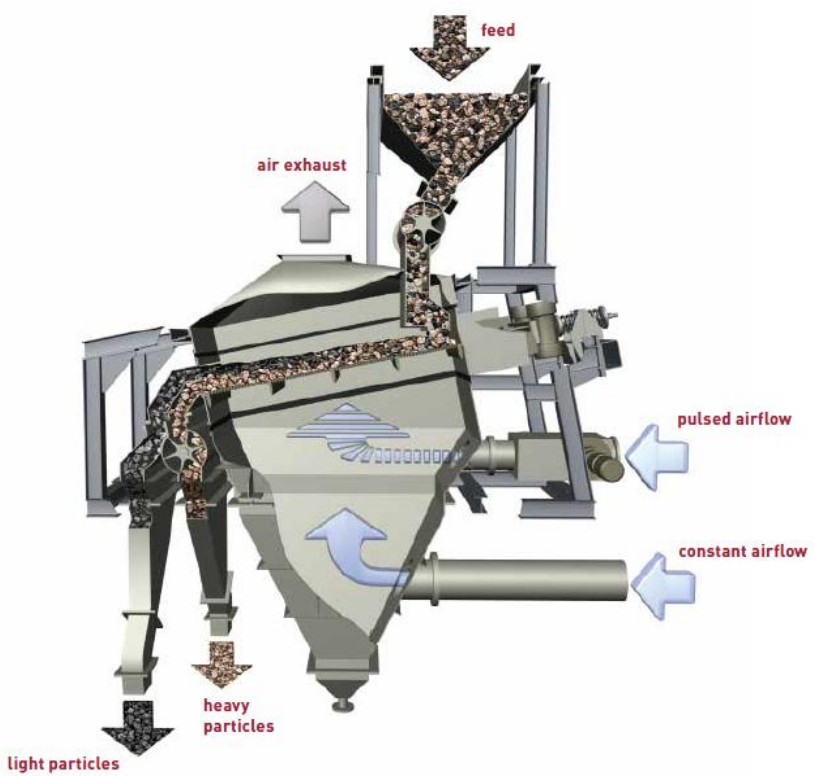

Fig.2 Allair-jig plant schematic

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

A JI-specific methodology is applied, as described in the PDD.

Baseline emissions come from three major sources:

1. Carbon dioxide emissions that occur during combustion of energy coal. These are calculated as stationary combustion emissions from coal in the equivalent of the amount of coal that is extracted from the waste heaps in the project scenario. This emission source is also present in the project scenario and the emissions are assumed to be equal in both project and baseline scenario. Therefore, this emission source is not included into consideration both in the project and the baseline scenarios.

2. Carbon dioxide emissions from burning waste heaps. These are calculated as stationary combustion emissions from coal in the equivalent of the amount of coal that is extracted from the waste heaps in the project scenario, adjusted by the probability of a waste heap burning at any point in time. As the baseline suggests that the current situation is preserved regarding the waste heaps burning, and the waste heaps in question are at risk of burning it is assumed that actual burning will occur. The correction factor is applied in order to address the uncertainty of the waste heaps burning process. This factor is defined on the basis of the survey of all the waste heaps in the area providing a ratio of waste heaps that are or have been burning at any point in time to all existing waste heaps. These emissions are calculated as emissions from two sources:

- Emissions of carbon dioxide generated by burning coal waste heaps, the equivalent amount of coal extracted from the rock waste heap in the project scenario, adjusted for the probability of burning waste heaps at any time;

- Emissions of carbon dioxide generated by burning coal waste heaps created by coal mining in the mine.

3. Emissions of carbon dioxide due to electricity and other energy resources at coal mining in the equivalent amount of coal extracted from the rock piles in the project scenario.

Project emissions come from three major sources:

1. Carbon dioxide emissions that occur during the combustion of energy coal are calculated as stationary combustion emissions from coal in the equivalent of the amount of coal that is extracted from the waste heaps in the project scenario. This emission source is also present in the baseline scenario and the emissions are assumed to be equal in both project and baseline scenario. Therefore, this emission source is not included into consideration both in the project and the baseline scenario.

2. Carbon dioxide emissions from the use of fuel to run part of the project equipment (motor cars).

3. Carbon dioxide emissions associated with the electricity consumption by the project equipment.

Leakages associated with fugitive methane emissions due to the mining activities. As coal in the baseline scenario is only coming from mines it causes fugitive emissions of methane. These are calculated as standard country specific emission factor applied to the amount of coal that is extracted from the waste heaps in the project scenario which is the same as the amount of coal that would have been mined in the baseline scenario.

Emission reductions due to the implementation of this project will come from two major sources:

1. Removing the source of green-house gas emissions from the burning / slow burning waste heap by the extraction of non-combusted coal contained in a waste heap;
2. Negative leakage through reduced fugitive emissions of methane due to the replacement of coal that would have been mined, by the coal extracted from the heap under the project activity.
3. Reduce electricity consumption at waste heap dismantling in comparison with energy consumption at coal mine.

A.6. Registration date of the project activity:

The project has not received the ID number ITL at this time. For information about the Letter of Approval, see paragraph A.2 of this Monitoring Report.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

The registered PDD uses crediting periods in line with the commitment periods under the Kyoto Protocol. Therefore the first commitment period will cover 2008 to 2012, the second period will be for 2013 to 2019.

Period	Start date	End date
1	01/06/2008	31/12/2012
2	01/01/2013	31/12/2019

Table.1 Crediting period dates

A.8. Name of responsible person(s)/entity(ies):

Contact information of the entity and persons responsible:
Mr. Tahir Musayev, Carbon Capital Services Limited,
Email t.musayev@gmail.com Tel/Fax: +38 044 490 6968.

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

1. The starting date of operation of the project activity.

The starting date of a JI project activity is the date on which the implementation or construction or real action of the project begins. This date is the date of putting into operation beneficial plant - 31/05/2008.

2. The information regarding the actual operation of the project activity during this monitoring period, including information on special events, for example overhaul times, downtimes of equipment, exchange of equipment, etc.

There were no special events during this monitoring period.

3. A brief description of: (i) events or situations that occurred during the monitoring period, which may impact the applicability of the methodology, and (ii) how the issues resulting from these events or situations are being addressed.

There were no special events during this monitoring period.

Procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting

In cases if any errors, fraud, inconsistencies or situations when monitoring data are unavailable will be identified during the monitoring process special commission will appointed by project host management that will conduct a review of such case and issue an order that must also include provisions for necessary corrective actions to be implemented that will ensure such situations are avoided in future.

The project host management will also establish a communication channel that will make it possible to submit suggestions, improvement proposals and project ideas for more accurate future monitoring for every person involved in the monitoring activities. Such communications will be delivered to the project host management who is required to review these communications and in case it is found appropriate implement necessary corrective actions and improvements. Project participant - will conduct periodic review of the monitoring plan and procedures and if necessary propose improvements to the project participants. Also, to prevent the situations in which monitoring data are unavailable, all parameters are fixed and saved on paper and electronically in a database the Owner and Developer of the project separately.

Emergency preparedness for cases where emergencies can cause unintended emissions

The project operation does not foresee any factors or emergencies that can cause unintended GHG emissions. Safe operation of equipment and personnel is ensured by systematic safety training. Procedures for dealing with general emergencies such as fire, major malfunction etc. are developed as part of the mandatory business regulations and are in accordance with local requirements.

B.2. Revision of the monitoring plan

The monitoring plan is presented in Section D PDD v03, used without revisions.

B.3. Request for deviation applied to this monitoring period

N/A

B.4. Notification or request of approval of changes

N/A

SECTION C. Description of the monitoring system

The monitoring plan is described in Section D and Annex 3 to PDD.

1. Introduction

The project adopts a JI specific monitoring approach. This monitoring plan describes the responsibilities of the JI Project Management Team and the methods and procedures to be adopted to implement the monitoring plan described in the Project Design Document in respect of this project activity.

2. Project Management & Responsibilities

The operational and management structure (as shown in below the figure) and the responsibilities of the principals are as follows. Ultimate responsibility for the project rests with the JI Project Manager.

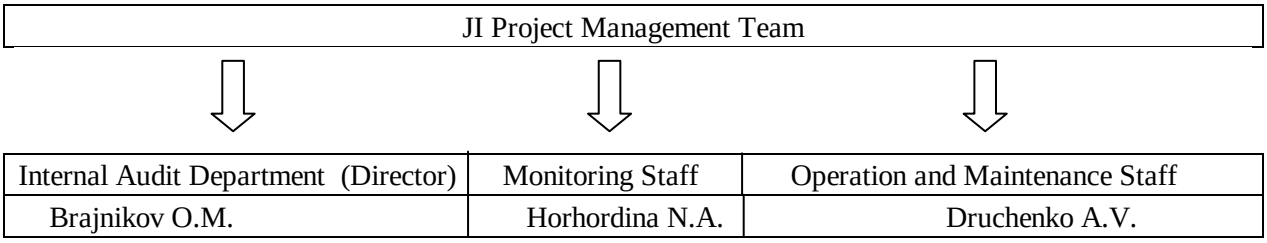

Fig.3 The management structure of the project

The JI Project Manager is responsible for:

- Checking and signing off all project operational-related activities
- Appointing and liaising with the accredited independent entity (AIE)
- Identifying an audit team leader to be appointed by the Chief Engineer or a delegated authority
- Appointing a JI technical team to undertake the operational activities
- Organizing training and refresher courses
- Preparing and supervising a Health and Safety Plan for the JI technical team
- Supervising the work of the JI technical team
- Cross checking reported volumes and sales receipts

Internal Audit Department (Director)

The project owner - Small Private Enterprise «BIK» implement provisions of this monitoring plan into its organizational and quality management structure. For monitoring, collection, registration, visualization, archiving, reporting of the monitored data and periodical checking of the measurement devices the management team headed by the Director of the company is responsible.

The monitoring staff is responsible for:

- Monitoring and recording of the relevant parameters

The operation and maintenance staff are responsible for:

- Operation and maintenance of the project infrastructure
- Service and maintenance equipment is performed by technical personnel beneficiation plant.

For monitoring period the following parameters have collected and registered:

1. Additional electricity consumed in the relevant period as a result of the implementation of the project activity

This parameter is registered by a specialized electricity meters. The meters are situated next to the current transformers on the site of the project activity. These meters register all electric energy consumed by the project activity as they are located on the only electrical input available on site. Readings are used in the commercial dealings with the energy supply company. Monthly bills for electricity are available. Regular cross-checks with the energy supply company have performed. Monthly and annual reports are based on the monthly bills.

2. Amount of diesel fuel that has been used for the project activity in the monitoring period.

For the metering of this parameter the commercial data of the company are used. Receipts and other accounting data are used in order to confirm the amount of fuel consumed. All fuel consumption is taken into account and is attributed to the project activity. If the data in the commercial documents mentioned are provided in liters rather than in tones the data in liters are converted into tones using the density of 0,85 kg/l[3]. Regular cross-checks with the suppliers are carried out. The monthly and annual reports are based on these data.

3. Amount of coal that has been extracted from the waste heaps and combusted for energy use in the project activity in the relevant period which is equal to the amount of coal that has been mined in the baseline scenario and combusted for energy use.

3.1. Amount of fraction (0-50mm).
For the metering of this parameter the commercial data of the company are used. Receipts and acceptance certificates from the customers are used in order to confirm the amount of coal restored. Only shipped coal is taken into account and is attributed to the project activity. Weighting of the coal is done on site by the special automobile scales. Regular cross-checks with the customers are performed. The monthly and annual reports are based on these shipment data.

3.2. Ash content and moisture of fraction (0-50mm).
Ash content and moisture fraction is defined accredited for technical competence and independence of the laboratory in accordance with regulations (GOST 11022-95 "Mineral solid fuel. Methods of determination the ash content"[4] , GOST 11014-2001 "Brown coal, hard coal and oil shale. Accelerated methods for determining the moisture" [5] and GOST 27314-91 «Mineral solid fuel. Methods of determination the moisture content»[6]. Analysis of ash content and moisture fraction is done in the laboratory. Ash content and moisture of coal fraction (0-50mm) measured regularly with registration annually certificates.

Setup of measurement installation

The measurement method selected for the project is based on measuring some monitored parameters - coal produced and electricity consumed - and relying on accounting documents and reports for other parameters (fuel used). The measurement setup is based on the following meters: for electricity consumed - the " EMS 132.10.1" electronic meter produced by Elgama-Elektronika[7] which is a multifunction device for measurement of electric energy; for coal produced - electronic automobile scales 60ВА1П produced

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[3] *GOST 305-82 Diesel Fuel. Specifications. 0,85 kg/l is taken as an avearage between two suggested types of diesel: summer and winter http://elarum.ru/info/standards/gost- 305-82/*

[4] *http://vsesnip.com/Data1/16/16768/index.htm*

[5] *http://vsesnip.com/Data1/40/40907/index.htm*

[6] *http://vsesnip.com/Data1/29/29367/index.htm*

[7] *http://www.elgama.com.ua/?right=ems*

by LLC "Company "Vagovimiryuvalni system"[8]. "EMS 132.10.1" electricity meter has 1.0 accuracy class. This type of meter requires calibration every 6 years in Ukraine. Automobile scales have the "average" accuracy class. This type of scales requires calibration every year in Ukraine. For the measurement of fuel consumption information from accounting department is used: receipts for the fuel purchased; reports on the fuel used and accounting documents for fuel usage.

Archiving, data storage and record handling procedure

Documents and reports on the data that are monitored is archived and stored by the project participants. The following documents is stored: primary documents for the accounting of monitored parameters in paper form; intermediate reports, orders and other monitoring documents in paper and electronic form; documents on measurement devices in paper and electronic form. These documents and other data monitored and required for determination and verification, as well as any other data that are relevant to the operation of the project is kept for at least two years after the last transfer of ERUs.

Training of monitoring personnel

The project utilizes technology that requires skills and knowledge in heavy machinery operation, coal beneficiation technology operation, electric equipment operation etc. This kind of skills and knowledge is available locally through the system of vocational training and education. This system is state-supervised in Ukraine. Professionals who graduate from vocational schools receive a standard certificate in the field of their professional study. Only workers with proper training can be allowed to operate industrial equipment like. Management of the project host ensures that personnel of the project have received proper training and are eligible to work with the prescribed equipment.

Training on safety issues is mandatory and was provided to all personnel of the project as required by local regulations. Procedure for safety trainings includes the scope of the trainings, training intervals, forms of training, knowledge checks etc. The project host management ensures maintain records for such trainings and periodic knowledge check-ups.

Activities that are directly related to the monitoring do not require specific training other than provided by the professional education. However, monitoring personnel have received training on monitoring procedures and requirements. Personnel of the project host management provide necessary training and consultations on Kyoto Protocol, JI projects and monitoring from the project participant.

The program of training

The project does not require extensive initial training. The staff has got basic industrial profession training locally. Most of the required personnel such as heavy machinery operators, trucks and excavator drivers, electric and mechanical maintenance workers are locally available.

The program of maintenance service

Maintenance needs are covered by the local capacities: in-house maintenance workers and outsourced maintenance and repair subcontractors. The project makes provisions for training needs. All workers have a valid professional education certificate and pass periodical safety trainings and exams. Professional education can be obtained locally in the Luhansk region in all of the professional areas covered by the project.

[8] http://www.vis-dnepr.com/vesy_v_dvigenie.html

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	**GWP_{CH4}**
Data unit:	**tCO_2e/tCH_4**
Description:	Global Warming Potential of Methane
Source of data used:	IPCC default value as per registered PDD
Value(s) :	21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage calculations
Additional comment:	

Data / Parameter:	**ρ_{CH4}**
Data unit:	**t/m^3**
Description:	Density of methane under conditions of 20°C and 1 atm
Source of data used:	Standard[9]
Value(s) :	0.00067
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage calculations
Additional comment:	

Data / Parameter:	**$EF_{CH4, CM}$**
Data unit:	**m^3/t**
Description:	Average rate for fugitive methane emissions from coal mining
Source of data used:	National Inventory Report of Ukraine 1990-2009, p.90
Value(s) :	25.67
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage calculations
Additional comment:	

Data / Parameter:	**$EF_{grid, y}$**
Data unit:	**tCO_2e/MWh**
Description:	Relevant emission factor for the electricity from the grid[10] by consumers of electricity, which referred to the 2-class in the year *y*
Source of data used:	For the years 2008-2011 – NEIA Orders No.43 dated 28.03.2011,

[9] *GOST 31369-2008 DIN ISO 6976 (1995): Density of methane under standard conditions of temperature (293.15 °K) and pressure (1013 mbar).*

[10] *For the years 2008-2011 – NEIA Orders No.43 dated 28.03.2011, No.62 dated 15.04.2011, No.63 dated 15.04.2011,No.75 dated 12.05.2011*
http://neia.gov.ua/nature/control/uk/publish/category?cat_id=111922

	No.62 dated 15.04.2011, No.63 dated 15.04.2011,No.75 dated 12.05.2011
Value(s) :	*2008*: 1.219; *2009*: 1.237; *2010*: 1.225; *2011*: 1.227
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project and baseline emission calculations
Additional comment:	

Data / Parameter:	$N^{E}_{Coal,y}$
Data unit:	**MWh/t**
Description:	Average electricity consumption per ton of coal, produced in Ukraine in the year *y*
Source of data used:	Fuel and energy resources of Ukraine, Statistical Yearbook, State Statistics Committee of Ukraine, Kiev 2009-2011[11]
Value(s) :	*2008*: 0.0878; *2009*: 0.0905; *2010*: 0.0926; *2011*: 0.0926
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Additional comment:	

Data / Parameter:	A_{Coal}
Data unit:	**%**
Description:	Average ash content of coal produced in Ukraine
Source of data used:	Guide of quality, volume of coal production and enrichment products in 2008¬2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Supporting document 2)
Value(s) :	*2008*: 38.60; *2009*: 39.20; *2010*: 39.70; *2011*: 39.80
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline, project emission and leakage calculations
Additional comment:	

Data / Parameter:	W_{Coal}
Data unit:	**%**
Description:	Average moisture of coal produced in Ukraine
Source of data used:	Guide of quality, volume of coal production and enrichment products in 2008¬2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Supporting document 2)
Value(s) :	*2008* *2009* *2010* *2011*

[11] http://www.ukrstat.gov.ua/

	8.60	8.20	8.30	8.30	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline, project emission and leakage calculations				
Additional comment:					

Data / Parameter:	ρ_{WHB}
Data unit:	**ratio**
Description:	Correction factor for the uncertainty of the waste heaps burning process
Source of data used:	Scientific research was verified and confirmed by accredited independent entities Bureau Veritas Certification Holding SAS and DNV Climate Change Services AS for analogous projects[12] such as "Waste heaps dismantling with the aim of decreasing the greenhouse gases emissions into the atmosphere" and " Processing of waste heaps at Monolith-Ukraine" in the Donbass.
Value(s) :	0.699
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations
Additional comment:	

Data / Parameter:	NCV_{coal}				
Data unit:	**GJ/t**				
Description:	Net Calorific Value of coal				
Source of data used:	National Inventory Report of Ukraine 1990-2009[13], p. 393 and 399				
Value(s) :	*2008*	*2009*	*2010*	*2011*	
	21.50	21.80	21.80	21.80	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations				
Additional comment:					

Data / Parameter:	$OXID_{COAL}$
Data unit:	**ratio**
Description:	Carbon Oxidation factor of coal
Source of data used:	National Inventory Report of Ukraine 1990-2009, p. 396 and 402

12 *http://ji.unfccc.int/JI_Projects/DB/VOZK3HERSNQGFLCY0YZ3AX5W676M5R/Determination/Bureau%20Veritas%20Certification1277814730.41/viewDeterminationReport.html* та *http://ji.unfccc.int/JI_Projects/DB/IPT7L3CLGIZTGGX27T2101W7XCUCWW/Determination/DNV-CUK1315829182.27/viewDeterminationReport.html*

13 *http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/ukr-2011-nir-08jun.zip*

Value(s) :	*2008*	*2009*	*2010*	*2011*	
	0.963	0.963	0.963	0.963	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations				
Additional comment:					

Data / Parameter:	k^{C}_{coal}				
Data unit:	**tC/TJ**				
Description:	Carbon content of coal				
Source of data used:	National Inventory Report of Ukraine 1990-2009, p. 395 and 401				
Value(s) :	*2008*	*2009*	*2010*	*2011*	
	25.95	25.97	25.97	25.97	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations				
Additional comment:					

Data / Parameter:	NCV_{diesel}				
Data unit:	**GJ/t**				
Description:	Net Calorific Value of diesel fuel				
Source of data used:	National Inventory Report of Ukraine 1990-2009, p. 404 and 407				
Value(s) :	*2008*	*2009*	*2010*	*2011*	
	42.20	42.40	42.40	42.40	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations				
Additional comment:					

Data / Parameter:	$OXID_{DIESEL}$				
Data unit:	**Ratio**				
Description:	Carbon Oxidation factor of diesel fuel				
Source of data used:	National Inventory Report of Ukraine 1990-2008, p. 406 and 409				
Value(s) :	*2008*	*2009*	*2010*	*2011*	
	0.99	0.99	0.99	0.99	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations				
Additional comment:					

Data / Parameter:	k^{C}_{diesel}				
Data unit:	**tC/TJ**				
Description:	Carbon content of diesel fuel				
Source of data used:	National Inventory Report of Ukraine 1990-2009, p. 405 and 408				
Value(s) :	*2008*	*2009*	*2010*	*2011*	
	20.20	20.20	20.20	20.20	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations				
Additional comment:					

D.2. Data and parameters monitored

Data / Parameter:	$FR_{Coal,y}$
Data unit:	**t**
Description:	Amount of sorted fraction (0-50mm), which is extracted from the waste heaps because of the project activity in a period y
Measured /Calculated /Default:	m
Source of data:	Weight Report
Value(s) of monitored parameter:	See Supporting document 1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline, project emission and leakage calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The electronic strain-measuring car scales 60BA1P
	Data unit: t Producer: LLC "Company "Vagovimiryuvalni system"[14] Type: The electronic car scales 60BA1P Serial number: B-036 Accuracy class: Medium (GOST 29329-92) Date of last calibration: 29/09/2011 Calibration frequency: 1 year Validity: SE «Luhanskstandartmetrologiya»
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Direct measurement and calculation according to state standards
QA/QC procedures applied:	Car scales are passed periodic calibration and verification by national standards.

Data / Parameter:	$FC_{BE,\,Coal,\,y}$
Data unit:	**t**
Description:	Amount of coal that has been mined in the baseline scenario and combusted for energy use, equivalent to the amount of coal extracted from the waste heaps in the project activity in period *y*

[14] http://www.vis-dnepr.com/vesy_v_dvigenie.html

Measured /Calculated /Default:	m
Source of data:	Data of the company
Value(s) of monitored parameter:	See Supporting document 1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline, project emission and leakage calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Calculated by the equation 3.
QA/QC procedures applied:	N/A

Data / Parameter:	$A_{Rock,y}$
Data unit:	**%**
Description:	Average ash content of sorted fraction (0-50 mm), which is extracted from waste heap in period y
Measured /Calculated /Default:	M
Source of data:	Data of the company.
Value(s) of monitored parameter:	See Supporting document 1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline, project emission and leakage calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	Laboratory research
QA/QC procedures applied:	According to the national standards.

Data / Parameter:	$W_{Rock,y}$
Data unit:	**%**
Description:	Average moisture of sorted fraction (0-50mm), which is extracted from waste heap in period y
Measured /Calculated /Default:	M
Source of data:	Data of the company.

Value(s) of monitored parameter:	See Supporting document 1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline, project emission and leakage calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	Laboratory research
QA/QC procedures applied:	According to the national standards.

Data / Parameter:	$EC_{PJ,y}$
Data unit:	**MWh**
Description:	Additional electricity consumed in period y as a result of the implementation of the project activity
Measured /Calculated /Default:	M,C
Source of data:	Acts from energy utility company
Value(s) of monitored parameter:	See Supporting document 1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Electronic meter "EMS 132.10.1" Data unit: kWh Producer: Elgama-Elektronika [15] Type: Electronic meter EMS Serial number: 442872 Accuracy class: 1.0 Date of last calibration: 15/02/2007 Calibration frequency: 6 yr Validity: "Lugansk Energy Union" Ltd.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	Direct measurement and calculation according to state standards
QA/QC procedures applied:	Electronic meter within TP is passed periodic calibration and verification by national standards.

Data / Parameter:	$FC_{PJ,Diesel,y}$
Data unit:	**t**

[15] http://www.elgama.com.ua/?right=ems

Description:	Amount of diesel fuel that has been used for the project activity in the period y
Measured /Calculated /Default:	C
Source of data:	Monthly data from the company
Value(s) of monitored parameter:	See Supporting document 1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	The calculation is based on actual value of fuel
QA/QC procedures applied:	N/A

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

Emissions in the baseline scenario are calculated as follows:

$$BE_y = BE_{WHB,y} + BE_{EL,y} + BE_{WHBC,y} \quad \text{(Equation 1)}$$

where:
BE_y - baseline emissions in period y (tCO_2e),
$BE_{WHB,y}$ - baseline emissions due to burning of the waste heaps in period y (tCO_2),
$BE_{EL,y}$ - baseline emissions due to consumption of electricity from a grid at coal mine in a period y,(tCO_2).
$BE_{WHBC,y}$ - baseline emissions due to burning of waste heap, created as a result of coal mining during the period y, (tCO_2).

Baseline Emissions due to burning of the waste heaps, in turn, are calculated as:

$$BE_{WHB,y} = FC_{BE,Coal,y}/1000*\rho_{WHB}*NCV_{Coal}*OXID_{Coal}*k^{C}_{Coal}*44/12 \quad \text{(Equation 2)}$$

where:

$FC_{BE,Coal,y}$ - amount of coal that has been mined in the baseline scenario and combusted for energy use, equivalent to the amount of coal extracted from the waste heaps in the project activity in period y, t. Calculated by the equation 3.
ρ_{WHB} - correction factor for the uncertainty of the waste heap burning process. This factor is defined on the basis of the survey of all the waste heaps in the area that provides a ratio of waste heaps that are or have been burning at any point in time to all existing waste heaps. This number is taken from the study of waste heaps in Luhansk region and is defined as the ratio of waste heaps that are or have been on fire historically to all existing waste heaps of Luhansk region. This ratio is equal to 0.699 according to this study.
NCV_{coal} - net calorific calue of coal, GJ/t.
$OXID_{coal}$ - carbon oxidation factor of coal, ratio.
k^{C}_{coal} - carbon content of coal, tC/TJ.
44/12 - ration between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2.

In this project there is no beneficiation of coal, so in order to correctly calculate the amount of energy coal produced in mines and substituted by coal, received by dismantling of waste heap, it is necessary to recount, taking into account different value of ash and moisture content of energy coal and fraction (0-50 mm),obtained by dismantling of the waste heaps. If in the mass of carbonaceous rocks we extract moisture and substances that are not burned during combustion, and turn to ash, we obtain the conditional ideal coal with no moisture and ash content. Therefore, to obtain coal with averaged over Ukraine characteristics it is necessary to add to that ideal coal the averaged moisture and ash content. In addition to moisture and ash, the coal (carbonaceous rocks) also contains sulfur, but its amount does not exceed a few percent[16], content of it in carbonaceous rocks always less than in coal, extracted from the mine, so to calculate the amount produced in coal mine, which replaced by coal from waste heaps, this value can be neglected. Thus, the amount of coal produced in mines in the baseline scenario is calculated by the equation:

$$FC_{BE,Coal,y} = FR_{Coal,y}*(1-A_{Rock,y}/100-W_{Rock,y}/100)/(1-A_{Coal,}/100-W_{Coal}/100) \quad \text{(Equation 3)}$$

Where:

[16] http://masters.donntu.edu.ua/2009/feht/semkovskiy/library/article9.htm

$FR_{Coal,y}$ - amount of sorted fraction (0-30mm), which is extracted from the waste heaps because of the project in a period y, t;
$A_{Rock,y}$ - the average ash content of sorted fractions(0-50mm), which is extracted from waste heap in period y,%;
$W_{Rock,y}$ - the average moisture of sorted fractions (0-50mm), which is extracted from waste heap in period y, %;
A_{Coal} - the average ash content of coal, mined in Ukraine, %;
W_{Coal}- the average moisture of coal, mined in Ukraine, %;
100 - conversion factor from percent to fraction, ratio.

Baseline emissions due to electricity consumption at coal mines in a period y, calculated by the equation:

$$BE_{EL,y} = FC_{BE,Coal,y} * N^{E}_{Coal,y} * EF_{grid,y} \quad \text{(Equation 4)}$$

where:
$FC_{BE,Coal,y}$ - amount of coal that has been mined in the baseline scenario and combusted for energy use, equivalent to the amount of coal extracted from the waste heaps in the project activity in period y, t. Calculated by the equation 3.
$N^{E}_{Coal,y}$ - average electricity consumption per ton of coal, produced in Ukraine in the year y, MWh/t
$EF_{grid,y}$ - relevant emission factor for the electricity from the grid in the period y.

Baseline emissions due to burning of waste heap, created as a result of coal mining during the period y, calculated by equation:

$$BE_{WHBC,y} = FC_{BE,Coal,y}/1000 * \rho_{WHB} * NCV_{Coal} * OXID_{Coal} * k^{C}_{Coal} * 44/12 * S_{Coal} * I_{Coal}/100 \quad \text{(Equation 5)}$$

$FC_{BE,Coal,y}$ - amount of coal that has been mined in the baseline scenario and combusted for energy use, equivalent to the amount of coal extracted from the waste heaps in the project activity in period y, t. Calculated by the equation 3.
P_{WHB} - correction factor for the uncertainty of the waste heap burning process. This factor is defined on the basis of the survey of all the waste heaps in the area that provides a ratio of waste heaps that are or have been burning at any point in time to all existing waste heaps.
NCV_{coal} - net calorific calue of coal, GJ/t.
$OXID_{coal}$ - carbon oxidation factor of coal, ratio.
k^{C}_{coal} - carbon content of coal, tC/TJ.
44/12 - ration between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2.
S_{Coal} - ratio of rock amount, which is in waste heap to the amount of coal produced due to mining, ratio.
I_{Coal} - percentage of coal in waste heaps' mass in Ukraine, %.

Value of emissions, calculated by the equation 5, differs from the value calculated by the equation 2, only two multiplier values S_{Coal} and I_{Coal}. According to the Scientific research was verified and confirmed by accredited independent entities Bureau Veritas Certification Holding SAS and DNV Climate Change Services AS for analogous projects ID: UA2000020 and UA2000034, the amount of rocks, which supplied into the waste heap, is 30-35% by weight of coal mined. Percentage of coal in the rock mass (also as ash content of rocks) for different waste heaps in the Ukraine has considerable variation, generally accounting for about 10%. Thus, the product $S_{Coal} * I_{Coal}$ is about 0.35 * 0.1 = 0.035, i.e. the quantity of emissions from this source is about 3.5% of the value of emissions from burning waste heaps in the project. However, the exact calculation of this value is associated with a high degree of uncertainty. This is due to, at first, that the ash content of rock in modern heaps is greater than such in the heap, which is considered in the project, though to apply it automatically for the new heap is not correct. In addition, modern coal mining at many cases conducted by technologies of back-filling without the formation of waste heap. Therefore, despite the fact that this source of emissions is significant, for reasons of conservatism in the calculation of the baseline take $BE_{WHBC,y} = 0$.

The total baseline emissions are presented in the table below.

		2008	2009	2010	2011	**Total**
Baseline Emissions due to burning of the waste heaps	tCO_2e	121864	127962	119374	187076	556276
Baseline Emissions due to consumption of electricity from the grid during mining	tCO_2e	9472	10252	9691	15211	44626
Total Baseline emissions during the period 01/06/2008-31/12/2011	tCO_2e	131336	138214	129065	202287	600902

Table.2 Total Baseline emissions

E.2. Project emissions calculation

The project emissions are calculated from the CO_2 emissions from the diesel fuel combustion and the additional energy consumption used by the formula given below.

Emissions from the project activity are calculated as follows:

$$PE_y = PE_{EL,y} + PE_{Diesel,y} \quad \text{(Equation 6)}$$

where
PE_y, -project emissions due to project activity in the period y (tCO_2e),
$PE_{EL,y}$ - project emissions due to consumption of electricity from the grid by the project activity in the period y (tCO_2e),
$PE_{Diesel,y}$ -project emissions due to consumption of diesel fuel by the project activity in the period y (tCO_2e).

These, in turn, are calculated as:

$$PE_{EL,y} = EC_{PJ,y} * PE_{grid,y} \quad \text{(Equation 7)}$$

where:
$EC_{PJ,y}$ - additional electricity consumed in period y as a result of the implementation of the project activity (MWh),
$EF_{grid,y}$ - relevant emission factor for the electricity from the grid in the period y, kgCO2/kWh (tCO2/MWh)

$$PE_{Diesel,y} = FC_{PJ,Diesel,y}/1000 * NCV_{Diesel} * OXID_{Diesel} * k^{C}_{Diesel} * 44/12 \quad \text{(Equation 8)}$$

where:
$FC_{PJ,Diesel,y}$ - amount of diesel fuel that has been used for the project activity in the period y, t.
NCV_{Diesel} - net calorific value of diesel fuel, GJ/t;
$OXID_{Diesel}$ - carbon oxidation factor of diesel fuel, ratio;
k^{C}_{Diesel} - carbon content of diesel fuel, t C/TJ;
$44/12$ - ration between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2.

The total project emissions are presented in the table below.

		2008	2009	2010	2011	**Total**
Project Emissions due to consumption of electricity from the grid by the project activity	tCO_2e	55	58	53	83	249
Project Emissions due to consumption of diesel fuel by the project activity	tCO_2e	70	71	67	107	315
Total Project emissions during period 01/06/2008-31/12/2011	$тCO_2e$	125	129	120	190	564

Table.3 Total Project emissions

E.3. Leakage calculation

Leakage is the net change of anthropogenic emissions by sources and/or removals by sinks of GHGs which occurs outside the project boundary, and that can be measured and is directly attributable to the JI project.

This project will result in a net change in fugitive methane emissions due to the mining activities. Source of the leakage is **the fugitive methane emissions** due to coal mining. This leakage is directly attributable to the JI project activity according to the following assumption: the coal produced by the project activity from the waste heap will substitute the coal produced by underground mines of the region in the baseline scenario. This assumption is explained by the following logic: Energy coal market is demand driven as it is not feasible to produce coal without demand for it. Coal is a commodity that can be freely transported to the source of demand and coal of identical quality can substitute some other coal easily. The project activity cannot influence demand for coal on the market and supplies coal extracted from the waste heaps. In the baseline scenario demand for coal will stay the same and will be met by the traditional source – underground mines of the region. Therefore, the coal supplied by the project in the project scenario will have to substitute the coal mined in the baseline scenario. It is also important to mention that Ukraine is a net exporter of energy coal so the coal produced by the project activity will substitute domestically mined coal (in 2010 energy coal production was 40.3 Mt, import was 3 Mt and export was 6.1 Mt[17]). According to this approach equivalent product supplied by the project activity (with lower associated specific green-house gas emissions) will substitute the baseline product (with higher associated specific green-house gas emissions).

This leakage is measurable: through the same procedure as used in 2006 IPCC Guidelines[18] (See Volume 2, Chapter 4, Page 4-11) and also used in CDM approved methodology ACM0009[19] (Page 8). Activity data (in our case amount of coal extracted from the waste heap which is monitored directly) is multiplied by the emission factor (which is sourced from the relevant national study - National Inventory Report[20] of Ukraine under the Kyoto Protocol) and conversion coefficients. It is important to mention that IPCC and relevant National Inventories take into account raw amount of coal that is being mined in these calculations whereas in the PDD coal extracted from the waste heaps is high quality coal concentrate. Therefore, approach taken in the PDD is conservative as in coal mining more raw coal should be mined causing more fugitive methane emissions to produce equivalent amount of high quality coal concentrate.

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[17] *http://www.uaenergy.com.ua/c225758200614cc9/0/d465824d78686a04c225787000542600*

[18] *http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf*

[19] *http://cdm.unfccc.int/methodologies/DB/2CRBYLJO5JWC9YHBSWJQWYIH2LLGMJ*

[20] *http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/ukr-2011-nir-08jun.zip*

The criteria for definition of the project boundary are provided in the *Guidance on criteria for baseline setting and monitoring*, JISC 18, Annex 2, paragraph 14. In the case of a JI project aimed at reducing emissions, the project boundary shall:

(a) Encompass all anthropogenic emissions by sources of GHGs which are:
(i) Under the control of the project participants;
(ii) Reasonably attributable to the project.

Therefore, fugitive CH_4 emissions from mining activities cannot be included into the project boundary as they are not "Under the control of the project participants". PDD correctly lists SPE "BIK" as a project participant hosting this project activity. SPE "BIK" is performing the dismantling of the waste heaps, processing waste heap matter with the dense medium cyclone technology. SPE "BIK" does not operate or own any coal mines, therefore, any changes in fugitive methane emissions from mining are not under the direct control of project participants. For this reason those leakages were included into the 'leakages' category and not considered the baseline emissions. Also, for example, approved CDM methodology ACM0009 "Consolidated baseline and monitoring methodology for fuel switching from coal or petroleum fuel to natural gas" Version 3.2 treats the same emission source as leakage – **Fugitive methane emissions** on Page 8 out of 16. It is also worth mentioning that leakage by definition is a "net change of anthropogenic emissions" and can be negative or positive depending on the nature of such change. It is also important to mention that including this particular source into baseline emissions or into leakages does not impact estimated emission reductions. For the value of Emission factor for fugitive methane emissions from coal mining (25,67 m^3/t) the data provided in the National Inventory Report [21]of Ukraine 1990-2009, p.90 are used. This document is the official GHG Inventory prepared by the Host Country as part of the reporting requirements of the Kyoto Protocol.

The description of this particular emission factor states that it is the weighted average emission factor for the methane emissions from coal mining sourced from the study - Triplett J., Filippov A., Paisarenko A. Inventory of methane emissions from coal mines in Ukraine: 1990-2001. Partnership for Energy and Environmental Reform, 2002[22].

As for the analogy with the electricity from the grid versus renewable electricity: the source of the leakage here are the fugitive methane emissions due to coal mining. These emissions are specific to the coal that is being mined. Coal produced by the project activity is not mined but extracted from the waste heap through the advanced beneficiation process. Therefore, coal produced by the project activity substitutes the coal would have been otherwise mined in the baseline. Coal that is mined in the baseline has fugitive methane emissions associated with it and the coal produced by the project activity does not have such emissions associated with it.

Leakages in the period y are calculated as follows:

$$LE_y = -LE_{CH4} \quad \text{(Equation 9)}$$

Leakages due to fugitive emissions of methane in the mining activities in the period y (tCO_2e).

$$LE_{CH4,y} = FC_{BE,Coal,y} * EF_{CH4,CM} * \rho_{CH4} * GWP_{CH4} \quad \text{(Equation 10)}$$

where:

$FC_{BE,Coal,y}$ - amount of coal that has been mined in the baseline scenario and combusted for energy use, equivalent to the amount of coal extracted from the waste heaps in the project activity in the period y, t. Calculated by the equation 3.

$EF_{CH4,CM}$ - emission factor for fugitive methane emissions from coal mining, m^3/t,

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21 *http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/ukr-2011-nir-08jun.zip*

22 *http://www.epa.gov/cmop/docs/inventory2002.pdf*

ρ_{CH4} - methane density, t/ m^3,
GWP_{CH4} - global warming potential of methane, tCO_2e/tCH_4.

		2008	2009	2010	2011	**Total**
Leakages due to fugitive emissions of methane in the mining activities in the period *y*	tCO_2e	-31963	-33075	-30855	-48354	-144247
Total leakages during the period 01/06/2008-31/12/2011	tCO_2e	-31963	-33075	-30855	-48354	-144247

Table.4 Total leakages

E.4. Emission reductions calculation / table

The emission reductions are calculated as follows:

$$ER_y = BE_y - LE_y - PE_y \quad \text{(Equation 11)}$$

where:

ER_y - emissions reductions of the JI project in period y (tCO_2e)

LE_y - leakages in period y (tCO_2e);

BE_y - baseline Emission in period y (tCO_2e);

PE_y - project Emission in period y (tCO_2e).

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO_2 equivalent)
2008	125	-31963	131336	**163174**
2009	129	-33075	138214	**171160**
2010	120	-30855	129065	**159800**
2011	190	-48354	202287	**250451**
Total (tonnes of CO_2 equivalent)	**564**	**-144247**	**600902**	**744585**

Table.5 Total Emission Reductions

E.5. Comparison of actual emission reductions with estimates in the JI-PDD

Item	Values applied in ex-ante calculation of the registered JI-PDD	Actual values reached during the monitoring period
2008	158847	163174
2009	167028	171160
2010	151906	159800
2011	238722	250451
Emission reductions (tCO_2e)	716503	744585

Table.6 Comparison of actual emission reductions with estimates in the JI-PDD

E.6. Remarks on difference from estimated value in the PDD

Differences between the estimated volume of emission reductions in registered PDD is associated with using actual data of average ash content and moisture of sorted fractions(0-50mm), which is extracted from waste heap, and average ash content and moisture of coal, mined in Ukraine, in 2008-2011.

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