

THE JOINT IMPLEMENTATION PROJECT

WASTE HEAPS DISMANTLING AT FORMER #6,  
KURSTOP AND VIOLIN MINES

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**JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM  
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**SECTION A. General description of the project****A.1. Title of the project:**

Waste Heaps Dismantling at Former #6, Kurstop and Violin Mines

Sectoral scope: 8. Mining/mineral production

PDD version: PDD, version 2.0

Date of the document: dated 10/12/2012

**A.2. Description of the project:***General description of the sector, company and activities*

Dumps (waste heaps) are an integral part of the Donbas region. One of the largest deposits of coal in the world is located in the Donetsk Basin (Ukraine, by geological reserves of fossil coal ranks first in Europe and eighth in the world). Coal production is carried out mostly through mining and has a 300-year history.

The total basin area is about 60 000 km<sup>2</sup> and covers the territory of the Dnipropetrovsk, Donetsk and Lugansk regions. Stocks of coal up to a depth of 1800 m are about 140.8 billion tons<sup>1</sup>.

Coal beds occur at medium (400-800 m ) and large (over 100 m) depth and in most cases have little power (about 0.6-1.2 m ) Layers of coal alternate with ordinary rock (shale, sandstone, limestone). Coal mining is accompanied, therefore, with lifting to the surface large amounts of rock. Rocks that are in the dump are formed by shaft sinking (52%) and repair (48%). These “empty” rocks are stored near mine shafts in the form of heaps up to 60-80 m and ridge dumps (in the amount 92%), more rarely – flat dumps (8%)<sup>2</sup> Rock dumps in Donbas cover an area of over 7000 hectares.

Most of the coal is produced by large coal-mining unions of varying ownership. Along with them, there are small private companies involved in coal extraction, coal processing (sorting, enrichment), and in the fuel trade.

“CE ‘GOSPODAR” Ltd is engaged in the wholesale fuel industry and has considerable experience in excavation and mining, as well as in land reclamation and landscaping. “CE ‘GOSPODAR” Ltd uses waste heaps: # 7 of former #6 mine, #7 of former “Kurstop” mine, #1 and # 2 of former “Violin” mine on legitimate basis.

*Situation before the proposed project start*

By-product of continuous operation of coal mines is the formation of conic dumps of coal rocks- heaps. Smoldering and burning waste heap is a fundamental factor in violation of environmental and economic balance of Donbass mining areas, causing the formation of a complicated ecological situation, which affects the state of atmosphere, soil, water objects, leading to the degradation of natural landscapes and detrimental to health and people life.

The process of enrichment at the mines was not very effective, it is not considered economically feasible to extract 100% of the coal out of rocks that rose to the surface. Consequently, the dumps in Donbass, especially formed in 60-70 years, contain large amounts of coal. Examined mine waste heaps mass has an ash content within 57-99%, accounting for an average of 88.5%. Humidity varies from 0.2% to 11.7%, accounting for an average 3.4%<sup>3</sup>. However, coal content, even within the same waste heap, undergoes significant fluctuations and poorly predicted. It is possible that a big part of the rock dump contain a small amount of coal, while another part has a high concentration of coal mass with increased susceptibility to spontaneous combustion. Over time, almost all dumps, that contain coal, are very susceptible to spontaneous ignition and self-sustained combustion. Those dumps, that are currently burning or are at a risk of ignition, are the source of uncontrolled emission of greenhouse gases and hazardous substances. Oxidation and combustion of rocks is accompanied by emission of wide range of volatile components that are emitted from the rock mass, enriched by coal substance. Hot waste heaps produce steam, which can contain not only water but such components as: sulfuric acid (sulfate ion), carbon dioxide, nitrogen dioxide (nitrate ion). With the lack of oxygen there are hydrogen sulfide, hydrocarbons,

<sup>1</sup> BS Busygin, Dr. Sc. Sciences, prof., EL Sergeyev. Monitoring data of Donbass heaps by multispectral satellite imagery. ISSN 2071-2227, Naukovy Visnyk of the NGU, 2011, # 2

<sup>2</sup> [http://www.ipages.ru/index.php?ref\\_item\\_id=2607&ref\\_dl=1](http://www.ipages.ru/index.php?ref_item_id=2607&ref_dl=1)

<sup>3</sup> [http://www.ipages.ru/index.php?ref\\_item\\_id=2607&ref\\_dl=1](http://www.ipages.ru/index.php?ref_item_id=2607&ref_dl=1)



ammonia, carbon monoxide in the gas-vapor emissions. Water erosion of the heap results in the leaching of toxic components and contamination of the soil and subsoil waters, extending them to a considerable distance. Thus, the role of heaps in the ecology of the region is extremely negative, increasing in many times during its burning. However, its outbreak and the possibility of explosion is very difficult to forecast and it can be only be estimated the probability of ignition, which is very high, based on statistical data. We can say that most waste heaps, sooner or later, ignite. The process of combustion of carbon in rock dumps is long lasting.

Despite the fact that the owners of waste heaps obliged to take measures to prevent their burning, immediate quenching of the rock dumps is not common practice in the Donbass region. Fines paid for the environmental pollution are much less than money spent on measures to prevent ignition or burning.

*In the baseline scenario* assumed that the common practice will be continued – heap can be spontaneously ignited with a certain probability, and the process of burning will continue till all coal, contained there, will be burned. The process of combustion is accompanied by release the carbon dioxide into atmosphere.

*Proposed project* provides complete dismantling of waste heaps with further reclamation of the area by restoring its fertile layer. During dismantling of waste heaps, the rock will be divided into fractions, which will be used for blending with steam coal and subsequently supplied to heat power plants and boiler houses for burning as fuel. After sorting, the large fractions will be used for building and repairing of roads. As the result, rock mass of the dump will be fully utilized, and the received coal will replace coal, which otherwise would have had to be mined. As the result of the project, the opportunity of self-ignition of waste heaps will be eliminated.

Brief history of the project: The project was initiated in January 2008. Preparatory works for waste heap dismantling start on January 22, 2008. Commissioning and the start of the sorting complex work is on February 18, 2008. From the beginning the project is considered as JI project. Project idea (PIN) was submitted to assigned Coordinated Center (State Agency of Environmental Investments) on 14/11/2012. An important component of the project is its second phase – complex reclamation of the area by restoring its fertile layer and full restoration of natural ecological community. These works are planned to be completed in 2015. This part of the project is required, but totally expensive, due to this mechanism of joint implementation was one of the prominent factors of the project from the beginning, and financial benefits as part of this mechanism considered one of the reasons of the project implementation.

### A.3. Project participants:

Table 1 - Project participants

<u>Party involved</u>	<u>Legal entity project participant (as applicable)</u>	Please indicate if the <u>Party involved</u> wishes to be considered as <u>project participant</u> (Yes/No)
Ukraine (Host party)	“CE ‘GOSPODAR’ Ltd	No
Republic of Latvia	SIA “Vidzeme Eko”	No

.The role of project participants:

- “CE ‘GOSPODAR’ Ltd - a legal entity, that operates lawfully the waste heaps : # 7 of former #6 mine, #7 of former “Kurstop” mine, #1 and # 2 of former “Violin” mine, and introduces the proposed JI project;
- SIA “Vidzeme Eko” responsible for the preparation of the PDD, obtaining approvals from the parties, monitoring and transfer of ERUs generated / AAUs.

See detailed information on project participants in Annex 1.

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

Technical description of the project, as well as detailed information on the location of the project, are given below in sections from A.4.1. to A.4.3.

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

Waste heaps : # 7 of former #6 mine, #7 of former “Kurstop” mine, #1 and # 2 of former “Violin” mine

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

Ukraine

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

Luhansk region, Krasnoluchska borough council.



Figure 1 - Location of the project on the map of Ukraine

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

Hrustalne urban village

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

Dismantling is carried out at four waste heaps located in Luhansk region of Krasnoluchska borough council, Hrustalne urban village. Waste heaps characteristics are specified in Table 2. Geographical coordinates of sorting unit: 48° 8' 34.31" N. Lt and 38° 54' 4.14" E.Ln.

Table 2 - Characteristics of waste heaps involved in the project.

#	Name of the waste heap	Volume, th.m <sup>3</sup>	Height, m	Area thousand. m <sup>2</sup>	coordinates
1	Waste heap #7 of former #6 mine	1145.5	83	45.4	48° 08' 53.09" N. Lt 38° 51' 31.98" E.Ln.
2	Waste heap #7 of former "Kurstop" mine	1447.6	82	46.5	48° 08' 37.16" N. Lt 38° 51' 52.64" E.Ln.
3	Waste heap #1 of former "Violin" mine	590.8	79	27.2	48° 09' 14.28" N. Lt 38° 52' 10.41" E.Ln.
4	Waste heap #2 of former "Violin" mine	725.4	78	29.4	48° 09' 14.29" N. Lt 38° 52' 17.62" E.Ln.



Figure 2 – Location of waste heaps and sorting unit involved in the project, view from satellite

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

The project provides the assemblage and installation of sorting rock mass complex of waste heaps # 7 of former #6 mine, #7 of former “Kurstop” mine, #1 and # 2 of former “Violin” mine consisting of :

- Point of loading rock mass on Conveyor SP-202MS<sup>4</sup>;
- Point of sorting rock mass in classes 0-30 mm and 30 mm (vibrating inertial sifter GIL-52<sup>5</sup>);
- Point of storage class 0-30 mm (sheds).

Table 3 – Technical characteristics, sifter GIL-52

Area screening surfaces, m <sup>2</sup>	1750X4500
The number of layers of sieves, unit	2
The angle of inclination, degrees	10-25
The size of a piece of raw material, mm	300
Productivity, t/h	250
Engine power, kW	13
Weight, kg	3680

Table 4 – Technical characteristics, scraper conveyor SP-202MS

#	Main parameters	Standards for implementation
1	Length of the conveyor, m	175
2	Productivity calculated, t / min	7.2
3	Speed of the traction body, m/sec	1,25
4	Reduction unit	Three- step conical - cylindrical
5	engine: - the type  - Power, kW - Number of units. - voltage	Three – phase, asynchronous, explosion – proof with squirrel-cage rotor  55 2 660

Class +30 mm is expected (as required under discharging tray of sifter) to be loaded in transports and delivered to customers for building and repairing of category 4-5 roads. Class 0-30 mm is expected to be loaded in transports, undergoes a mandatory procedure of weighting and is sent to the consumer for blending and subsequent combustion in the thermal power plants or boiler houses. Blending of fraction (0-30) with a steam coal allows to realize the fine finishing of quality the energy coal to the requirements of Standart 4083-2002, without compromising the quality of fuel on the one hand, but resulting in saving valuable energy coal on the other hand.

<sup>4</sup> <http://www.rpromresurs.ru/konveer/sp202ms.html>

<sup>5</sup> [http://www.litstroy Mash.ru/GIL\\_52](http://www.litstroy Mash.ru/GIL_52)





Figure 3 - Equipment for the rock mass sorting



Figure 4 - Machinery involved in the project.



The rock mass, after being dismantled by bulldozers T-170<sup>6</sup> (operating power – 132 kW, specific fuel consumption – 218 g/ kW), is loaded by loader SEM 652B<sup>7</sup> (load-lift capacity 5000 kg with a bucket capacity of 3.3 m<sup>3</sup>, operating power 154 kW) into vehicles. Then the rock mass is delivered by trucks to the intermediate storage.

The combined method is used for the dump dismantling after bulldozers layer by layer get to the height where the entrance road can be constructed; further dismantling is carried out by excavator Hitachi ZX450-3<sup>8</sup> (bucket capacity- 2.5 m<sup>3</sup>, operating power-260 kW) with the direct rock loading into trucks with further delivery to the intermediate storage of the industrial site.

Before the delivery of the rock mass to the belt conveyor, the moisture is applied (humidity of raw materials does not exceed 8%) by sprinklers. The rock mass is loaded by Loader SEM 652B on the scraper conveyor SP-2002. Product of sorting class 0-30 through handling unit of sifter supplied on belt conveyor KLS<sup>9</sup>. From the belt conveyor the rock mass of class 0-30 mm through the handling unit of conveyor with built-in nozzles for humidification is emptied on the intermediate platform without significant accumulation, where loader SEM 652B loads it in trucks or on a platform (warehouse) for storage. Storage is used if necessary without long-term storage. From the storage the rock mass 0-30 mm by is loaded by loader into trucks.

The project capacity of the complex allows to process 800 thousand m<sup>3</sup> of the rock per year.

Commissioning and the start of the work of the sorting complex - February 18, 2008.

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

The project activities is aimed at extraction of coal from the dump, which is in lawful possession by “CE ‘GOSPODAR’ Ltd, in order to prevent emissions into the atmosphere when spontaneous burning of dumps occur and to receiving more quantity of coal. Sorted fraction 0-30mm is delivered for blending with steam coal and subsequent combustion at power plants or boiler houses. In addition, sorted rock mass of class 30 mm is planned for building and repairing roads of 4-5 category at its own expense without receiving any material benefit.

After the final sorting of the dump reclamation of the land is planned via restoration of the vegetation layer. After the restoration of the vegetation layer, grass, trees, and shrubs natural for climatic zone of Donbas region will be planted

The problem of waste heaps is very crucial nowadays in the Donbass. Waste heaps not only derive considerable land area from economic turnover and lead to disruption of ecological balance of natural biological community, but also are a source of high environmental hazard. Even at non-burning condition heap is a source of pollution of air, soil, nearby water and groundwater. This risk is increased in many times by burning waste heap<sup>10</sup>. The only way to eliminate the harmful effects of heap on the environment is its complete dismantling. However, the process of dismantling of heap is a very expensive process, which economic benefit is not offset possible costs. In addition there are significant risks associated with the

inability to timely determination of coal in total volume of waste heap. Significant costs bears followed after dismantling renewal of fertile layer and reclamation of earth area. This leads to a situation where the process of dismantling of heap facing financial difficulties, and for its successful implementation it is necessary to search for additional sources of funding. Receipt of additional income from the sale of quotas under the Joint Implementation project provides a powerful incentive for successful completion of this project.

Processing of these dumps will avoid their burning, improve ecological situation in the region, and significantly reduce CO<sub>2</sub> emissions and other harmful substances. Dismantling of rock dumps will reduce the

<sup>6</sup> [http://www.pervoe.su/tex11\\_02.php](http://www.pervoe.su/tex11_02.php)

<sup>7</sup> [http://bizon.lg.ua/products/SEM\\_652B/](http://bizon.lg.ua/products/SEM_652B/)

<sup>8</sup> <http://www.pogruzchiki.com/loaders.asp?loader=4037&excavator=hitachi>

<sup>9</sup> [http://www.sibtenzo.com/vesi/1077\\_detail.htm](http://www.sibtenzo.com/vesi/1077_detail.htm)

<sup>10</sup> [http://terrikon.donbass.name/ter\\_s/290-model-samovozgoraniya-porodnyx-otvalov-ugolnyx-shaxt-donbassa.html](http://terrikon.donbass.name/ter_s/290-model-samovozgoraniya-porodnyx-otvalov-ugolnyx-shaxt-donbassa.html)



probability of groundwater contamination. The area of land for agricultural activities and for other purposes will increase. Also, extra amount of coal will be obtained that does not require mining, thus it is possible to avoid leakages of methane, which accompanies coal mining. Emission reductions can be sold as ERUs on the international market of emissions trading.

The proposed project is aimed at reducing anthropogenic emissions. Emission reductions created by:

- Elimination of greenhouse gases sources associated with burning waste heaps, by extracting coal from the rock dumps;
- Reduction of uncontrolled methane emissions due to replacement of coal that would have been extracted through mining;
- Reduction of electricity consumption at waste heap dismantling in comparison to electricity consumption at coal mine.

Efforts to stop dumps burning and their full dismantling corresponds to the current legislation of Ukraine on the environmental protection. The proposed project is evaluated positively by local authorities.

Detailed description of the baseline and additionality, contained in Section B of the project documentation.

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

Table 5 - The total expected emission reductions over the crediting period

	Years
Length of the <u>crediting period</u>	4 years 10 months
Year	Estimate of annual emission reductions in tonnes of CO <sub>2</sub> equivalent
2008	959299
2009	1039554
2010	1069826
2011	1015892
2012	1013277
Total estimated emission reductions over the <u>crediting period</u> (tonnes of CO <sub>2</sub> equivalent)	<b>5 097 848</b>
Annual average of estimated emission reductions over the <u>crediting period</u> (tonnes of CO <sub>2</sub> equivalent)	<b>1 054 727</b>

Duration of the crediting period - four years ten months (58 months).

The beginning of the crediting period -18/02/2008

The end of the crediting period – 31/12/2012

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

Project Idea (PIN) was given to the Designated Coordinating Center (State Environmental Investment Agency) on 14/11/2012. Letter of endorsement # 3778/23/7 was received on 07/12/2012. It is planned to get Letter of approval from a foreign country in December 2012. Parties involved authorize “CE ‘GOSPODAR” Ltd. (Ukraine) and SIA “Vidzeme Eko” (Latvia) to be participants of the project. Authorisation is confirmed by the Letter of endorsement and by the Letter of approval. . It is planned to get Letter of approval from SEIA in December 2012.

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

The baseline for a JI project should be brought into compliance with Annex B to Decision 9/CMP.1 ("Guidelines for the implementation of Article 6 of the Kyoto Protocol")<sup>11</sup>, and according to the "Guidance On Criteria For Baseline Setting And Monitoring", Version 03<sup>12</sup> (hereinafter - the "Guidance") issued by the supervisory JI (JISC).

Under the Guidance, the baseline for a JI project is a scenario that objectively represents the anthropogenic emissions of GHG sources or anthropogenic GHG removals by the acquisition, which may occur in the absence of the proposed project. In accordance with paragraph 9 of the Guidance, the project participants may choose either approach within the criteria for establishing the baseline and monitoring, as long as the approach is designed in accordance with Annex B of the Guidance or method for determining the baseline setting and monitoring adopted by the Executive Committee of the clean development mechanism (CDM).

Article 11 of Guidance allows project participants to choose an approach to JI projects, or it must be used approved methodologies for CDM baseline or approved CDM methodological tools. The specific approach of JI was used to determine the baseline.

For description and justification of the baseline the following step by step approach used:

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

The baseline of this project is defined on a special project basis in accordance with Article 21 of the JISC Guidance. Can not be used multi-project emission factor or sectoral baseline, because the project under consideration is one of the few of its kind, both in the sector (mining of rock dumps in Ukraine) as well as among JI projects.

According to Article 9 of the JISC Guidance, Option A selected for determining the baseline: *(a) An approach for determining the baseline and monitoring designed in accordance with Annex B of JI Guidelines (JI specific approach);*

Under Article 11 of Guidance for setting the baseline the latest version of the current methodology is used, which have chosen in the project " Waste heaps dismantling with the aim of decreasing the greenhouse gases emissions into the atmosphere. ", which is published on the website of the UNFCCC<sup>13</sup>.

Taking in account JT-specific-approach for determining the baseline according to Article 24 of the JISC Guidance, the baseline is identified by a list and description of possible future scenarios based on conservative assumptions and choosing one of the most likely.

The most likely future scenarios will be identified by checking whether all alternatives to meet the applicable law and regulations, and by analyzing the barriers. If only two alternatives remained, one of which represents the project scenario without the JI incentive, must be used Tool Clean Development Mechanism (CDM) "Tool for demonstration and assessment of additionality" Version 06.0.0 to prove that the project scenario cannot be regarded as the most plausible.

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

Plausible future scenarios will be identified in order to establish a baseline.

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<sup>11</sup> <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf>

<sup>12</sup> [http://ji.unfccc.int/Ref/Documents/Baseline\\_setting\\_and\\_monitoring.pdf](http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf)

<sup>13</sup> <http://ji.unfccc.int/UserManagement/FileStorage/IE7LK2SZF1NOXRVB4CYG65WQPJMHA3>

***Sub step 2a. Identifying and listing plausible future scenarios.*****Scenario 1. Continuation of existing situation**

In the current situation waste heaps are not utilized. Spontaneous self-heating and subsequent burning of waste heaps is very common and measures to extinguish fire are taken sporadically. Burning waste heaps are sources of uncontrolled greenhouse gas emissions. Coal is not extracted from the waste heaps. Coal is produced by underground mines of the region and used for energy production or other purposes. Coal mining activities cause emissions of fugitive methane and also the formation of new waste-heaps.

**Scenario 2. Direct energy production from the heat energy of burning waste heap**

Waste heaps are not extinguished and not monitored properly. Some burning heaps are used to produce energy by direct insertion of heat exchangers into the waste heap<sup>14</sup>. This captures a certain amount of heat energy for direct use or conversion into electricity. The coal is not extracted from the waste heaps. Coal is produced by underground mines of the region and used for energy production or other purposes. Mining activities, resulting in fugitive gas release, and the formation of more waste-heaps.

**Scenario 3. Production of construction materials from rock dumps.**

Waste heaps are processed in order to produce construction materials (bricks, panels, etc.). Coal in the waste heap matter is burnt during the agglomeration process<sup>15</sup>. Coal is produced by underground mines of the region and used for energy production or other purposes. Mining activities, resulting in fugitive gas release, and the formation of more waste-heaps.

**Scenario 4. Coal extraction from waste heaps without JI incentives**

This scenario is similar to the project activity only in this case the project does not benefit from the possible development as a joint implementation project. In this scenario waste heaps are processed in order to extract coal and used in the energy sector. Less coal is produced by underground mines of the region.

**Scenario 5. Systematic monitoring of waste heaps condition and regular fire prevention and extinguishing measures**

Waste heaps are systematically monitored and their thermal condition is researched. Regular fire prevention measures are taken. In case of a burning waste heap, the fire is extinguished and measures are taken to prevent burning in the future. Coal is not extracted from the waste heaps. Coal is produced by underground mines of the region and used for energy production or other purposes. Mining activities, resulting in fugitive gas release, and the formation of more waste-heaps.

***Sub step 2b. Consistency with mandatory applicable laws and regulations.***

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<sup>14</sup> *Method to utilize energy of the burning waste heaps*, Melnikov S.A., Zhukov Y.P., Gavrilenko B.V., Shulga A.Y., State Committee Of Ukraine For Energy Saving, 2004  
<http://masters.donntu.edu.ua/2004/fgtu/zayanchukovskaya/library/artcl3.htm>

<sup>15</sup> *Opportunities for international best practice use in coal mining waste heap utilization of Donbas*, Matveeva N.G., Ecology: Collection of Scientific Papers, Eastern Ukrainian National University, Luhansk, #1 2007  
[http://www.nbu.gov.ua/portal/natural/Ecology/2007\\_1/Article\\_09.pdf](http://www.nbu.gov.ua/portal/natural/Ecology/2007_1/Article_09.pdf)



Existing Ukrainian laws and regulations treat waste heaps as sources of possible dangerous emissions into the atmosphere. In general burning waste heaps should be extinguished and measures must be taken to prevent fires in the future. However, due to the large numbers of waste heaps and their substantial sizes, combined with the limited resources of the owners, they typically do not even undertake the minimum required regular monitoring. Even when informed of a burning waste heap, and measures have to be taken under existing legislation, it is more typical to accept the fine for air contamination, rather than take action to extinguish the burning waste heap itself. Monitoring of dumps is not conducted systematically, and all activities are at the discretion of the dumps owner. Basically, dumps are in ownership of mines or regional coal association. Coal mines of Ukraine suffer from limited investment, which often leads to security problems due to severe conditions of production and financial difficulties, including the wages of miners often delayed for several months. In this case dumps are considered as an additional burden, but mine owners usually do not make even minimum measures required. Ignition and burning heaps are very common, and only concerning 48 out of 237 waste heaps, which were investigated in Luhansk region, was exactly known that they didn't burn, also exact data are not always available<sup>16</sup>. In such circumstances it is safe to say that all scenarios do not contradict existing laws and regulations.

### ***Sub step 2c. Barrier analysis***

#### Scenario 1. Continuation of existing situation

This scenario does not anticipate any activities and therefore does not face any barriers.

#### Scenario 2. Direct energy production from the heat energy of burning waste heap

*Technological barrier:* This scenario is based on the highly experimental technology, which has not been implemented even in a pilot project. It is also not suitable for all waste heaps as the project owner will have to balance the energy resource availability (i.e. waste heap location) and the location of the energy user. On-site generation of electricity addresses this problem but requires additional interconnection engineering. In general this technology has yet to prove its viability. In addition it does not allow the control and management of the emitted gases. This technology can be applied only in the presence of dumps with developed combustion center. Even if the probability of burning rock dump is very high, it is currently impossible to predict the time of its outbreak and therefore predict the start of the use of thermal energy released during its combustion.

*Investment barrier:* Investment into unproven technology carries a high risk. In case of Ukraine, which carries a high country risk, investment into such unproven energy projects are less likely to attract investors than some other opportunities in the energy sector with higher returns. The pioneering character of the project may appeal to development programmes and governmental incentives but cost of the produced energy is likely to be much higher than alternatives.

#### Scenario 3. Production of construction materials from waste heap matter

*Technological barrier:* This scenario is based on known technology, however, this technology is not currently available in Ukraine and there is no evidence that such projects will be implemented in the near future. It is also not suitable for all types of waste heaps as the content of waste heap has to be predictable in order for project owner to be able to produce quality materials. High contents of sulphur and moisture can reduce the suitability of the waste heap for processing. A large scale deep exploration of the waste heap has to be performed before the project can start.

#### Scenario 4. Coal extraction from waste heaps without JI incentives

*Investment barrier:* This scenario is financially unattractive and faces barriers. Please refer to section B.2 for details.

#### Scenario 5. Systematic monitoring of waste heaps condition and regular fire prevention and extinguishing measures

*Investment barrier:* This scenario does not represent any revenues but anticipates additional costs for waste heaps owners. Monitoring of the waste heap status is not done systematically and in general actions are left to the discretion of the individual owners. Waste heaps are mostly owned by mines or regional coal mining

<sup>16</sup> Report on the analyzing the fire danger of waste heaps in Luhansk region, Scientific Research Institute "Respirator", Donetsk, 2012. This report will be provided to an independent expert organization.



associations. Coal mines in Ukraine suffer from limited investment resulting often in safety problems due to complicated mining conditions and financial constraints, with miners' salaries often being delayed by few months. Waste heaps in this situation are considered as additional burdens and mines often do not even perform minimum required maintenance. Exact data are not always available. From a commercial view point the fines that are usually levied by the authorities are considerably lower than costs of all the measures outlined by this scenario.

#### ***Sub step 2d. Baseline identification***

All scenarios, except Scenario 1 - Continuation of existing situation, face prohibitive barriers. Therefore, continuation of existing situation is the most plausible future scenario and is the baseline scenario.

This baseline scenario has been established according to the criteria outlined in the JISC Guidance:

- 1) On a project specific basis. This project is the few of its kind and therefore other options could not be used;
- 2) In a transparent manner with regard to the choice of approaches, assumptions, methodologies, parameters, data sources and key factors. All parameters and data are either monitored by the project participants or are taken from sources that provide a verifiable reference for each parameter. Project participants use approaches suggested by the JISC Guidance and methodological tools provided by the CDM Executive Board;
- 3) Taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector. It is demonstrated by the above analysis that the baseline chosen clearly represents the most probable future scenario given the circumstances of modern day Luhansk coal sector;
- 4) In such a way that emission reduction units (ERUs) cannot be earned for decreases in activity levels outside the project activity or due to force majeure. According to the proposed approach emission reductions will be earned only when project activity will generate coal from the waste heaps, so no emission reductions can be earned due to any changes outside of project activity.
- 5) Taking account of uncertainties and using conservative assumptions. A number of steps have been taken in order to account for uncertainties and safeguard conservativeness:
  - a. Same approaches as used for the calculation of emission levels in the National Inventory Reports (NIRs) of Ukraine are used to calculate baseline and project emissions when possible. NIRs use the country specific approaches and country specific emission factors that are in line with default IPCC values;
  - b. Lower range of parameters is used for calculation of baseline emissions and higher range of parameters is used for calculation emissions as a result of introduction of the project.
  - c. Default values were used to the extent possible in order to reduce uncertainty and provide conservative data for emission calculations.

#### **Baseline Emissions**

In order to calculate baseline emissions following assumptions were made:

- 1) The project will produce carbonaceous fraction (0-30mm), which contains energy coal that will displace the same amount of the same type of coal in the baseline scenario;
- 2) The coal that is displaced in the baseline scenario and the coal that is generated in the project activity are used for the same type of purpose and is stationary combusted;
- 3) The coal that is displaced in the baseline scenario is produced by the underground mines of the region and as such causes fugitive emissions of methane;
- 4) Coal production in the mine involves using a large amount of electricity (see annex 5);
- 5) Coal production in mine is accompanied by consumption of other energy sources (gas, diesel, fuel oil), but their share in compare with electricity are small<sup>17</sup>;
- 6) Regional waste heaps are vulnerable to spontaneous self-heating and burning and at some point in time will burn;
- 7) The probability of the waste heap burning at any point in time is determined 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;
- 8) Coal burning in the waste heaps will oxidize to CO<sub>2</sub> completely if allowed to burn uncontrolled.

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<sup>17</sup> The effective method of electricity consumption control at coal mines. B.A.Gryaduschy, Doctor of Technical. Science, DonUGI, G.N.Lisovoy, V.I.Myalkovsky, Chehlaty NA, Cand. Science, NIIGM named M.M.Fedorov, Donetsk, Ukraine [www.mishor.esco.co.ua/2005/Thesis/10.doc](http://www.mishor.esco.co.ua/2005/Thesis/10.doc)



9) Carbonaceous rocks are delivered to the consumer without significant accumulation on the intermediate storage, due to this emissions of methane of enriched rocks can be neglected.

10) Sorted fraction +30 mm has a low content of coal and has no tendency to spontaneous ignition.

Baseline emissions come from two major sources:

- Carbon dioxide emissions that occur during combustion of energy coal. These are calculated as stationary combustion emissions from mining coal in the equivalent of the amount of coal that is extracted from the waste heap in the project scenario. These emissions in the baseline scenario is exactly equal to the same emissions in the project scenario, thus are excluded from the calculation;

- Carbon dioxide emissions from burning waste heaps. These emissions are calculated as emissions of carbon dioxide generated by burning coal dumps, the equivalent amount of coal extracted from the rock dump in the project scenario, adjusted for the probability of burning dumps at any time;

As the baseline suggests that the current situation is preserved regarding the waste heaps burning, it is assumed that for any given waste heap, actual burning will occur at some point in time. This probability of burning is established by the study<sup>18</sup> that assessed the status of all existing waste heaps in Luhansk region historically. Based on the gathered data it is concluded that 78% of all waste heaps in the Luhansk region have been, or are now, on fire.

The table below provides values for constant parameters used to determine the baseline emissions.

Table 6 - List of constants and parameters in the calculation of baseline emissions

<i>Data / Parameter</i>	<i>Data unit</i>	<i>Description</i>	<i>Data Source</i>	<i>Value</i>
$HCV_{Coal}$	kcal/kg	High Calorific Value of steam coal	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4) (in the monitoring period the value can be changed)	2008-8074 2009-7641 2010-7641 2011-7641 2012-7641
$OXID_{Coal}$	d/l	Carbon Oxidation factor of steam coal	National Inventory Report of Ukraine 1990- 2010, p. 459, 465, 471(in the monitoring period the value can be changed)	2008-0.963 2009-0.963 2010-0.962 2011-0.962 2012-0.962
$K_{Coal}^c$	tC/TJ	Carbon content of steam coal	National Inventory Report of Ukraine 1990- 2010, p. 458, 464, 470(in the monitoring period the value can be changed)	2008-25.95 2009-25.97 2010-25.99 2011-25.99 2012-25.99
$A_{Coal}$	%	The average ash content of steam coal produced in Luhansk region of Ukraine	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4) (in the monitoring period the value can be changed)	2008 – 37.20 2009 – 38.40 2010 – 38.10 2011 – 38.10 2012 – 38.10
$W_{Coal}$	%	The average moisture of steam coal produced in Luhansk region of Ukraine	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4) (in the monitoring period the value can be changed)	2008 – 7.20 2009 – 7.40 2010 – 7.40 2011 – 7.40 2012 – 7.40
$p_{WHB}$	d/l	Probability of waste heap burning.	<i>Report on the analyzing the fire danger of waste heaps in Luhansk region</i> , Scientific Research Institute “Respirator”, Donetsk, 2012.	0.78
$k$	d/l	Hydrogen content factor of coal	State Standard 4083-2002. Coal and anthracite for powdered combustion in thermal power plants. Kyiv.	0.21

<sup>18</sup> *Report on the analyzing the fire danger of waste heaps in Luhansk region*, Scientific Research Institute “Respirator”, Donetsk, 2012. This report will be provided to an independent expert organization.





			State Standard of Ukraine 2002. The standard will be provided by an independent expert organization.	
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Emissions in the baseline scenario are calculated as follows:

$$BE_y = BE_{WHB,y} \quad , \quad (1)$$

where:

$BE_y$  – baseline emissions in the year  $y$  (tCO<sub>2</sub> e),

$BE_{WHB,y}$  - baseline emissions due to burning of the waste heap in the year  $y$  (tCO<sub>2</sub> e),

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 (0-30), obtained by dismantling of the waste heap. 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<sup>19</sup>, 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 heap, this value can be neglected. For the calculation are used data on ash content and moisture content of steam coal that is mined in the Luhansk region of Ukraine according to the annual Guide of Ministry of Coal Industry<sup>20</sup>

Thus, the amount of coal produced in mines in the baseline scenario is calculated by the formula:

$$FC_{BE,Coal,y} = FR_{Coal,y} \cdot \left(1 - \frac{A_{Rock,y}}{100} - \frac{W_{Rock,y}}{100}\right) / \left(1 - \frac{A_{Coal}}{100} - \frac{W_{Coal}}{100}\right), \quad (2)$$

where:

$FR_{Coal,y}$  - amount of sorted fraction (0-30mm), which is extracted from the dumps because of the project in a year  $y$ , that came to blending with further combustion in thermal power plants, t;

$A_{Rock,y}$  -the average ash content of sorted fractions (0-30mm), which is extracted from dump in year  $y$ , %;

$W_{Rock,y}$  -the average humidity of sorted fractions (0-30mm), which is extracted from dump in year  $y$ , %;

$A_{Coal}$  - the average ash content of steam coal, mined in Luhansk region in year  $y$ , % ;

$W_{Coal}$  -the average humidity of steam coal, mined in Luhansk region in year  $y$ , % ;

100 - conversion factor from percent to fraction, d/l.

Baseline emissions due to burning dumps in year  $y$  calculated by the formula:

$$BE_{WHB,y} = \frac{FC_{BE,Coal,y}}{1000} \cdot p_{WHB} \cdot NCV_{Coal} \cdot OXID_{Coal} \cdot K_{Coal}^C \cdot 44/12 \quad (3)$$

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 because of the project activity in the year  $y$ , t, (calculated by the formula (2));

$p_{WHB}$  - probability of waste heap burning , d/l;

$NCV_{Coal}$  - net Calorific Value of steam coal, TJ/kt;

$OXID_{Coal}$  - carbon Oxidation factor of coal, d/l;

$K_{Coal}^C$  - carbon content of coal, tC/TJ;

<sup>19</sup> <http://masters.donntu.edu.ua/2009/feht/semkovskiy/library/article9.htm>

<sup>20</sup> Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4)



1/1000 - conversion factor from tons in kilotonnes, d / l

44/12 - stoichiometric relationship between the molecular weight of carbon dioxide and carbon.

Net Calorific Value of steam coal calculated by the formula<sup>21</sup>:

$$NCV_{Coal} = \left\{ HCV_{Coal} * \left( 1 - \frac{A_{Coal}}{100} \right) * \left( 1 - \frac{W_{Coal}}{100} \right) - 2.442 * \left[ \frac{W_{Coal}}{100} + k * \left( 1 - \frac{A_{Coal}}{100} \right) * \left( 1 - \frac{W_{Coal}}{100} \right) \right] \right\} * 4.187 / 1000 \quad (4)$$

де:

$HCV_{Coal}$  - High Calorific Value of steam coal, kcal/kg

$A_{Coal}$  - The average ash content of steam coal produced in Luhansk region of Ukraine, in year y, %

$W_{Coal}$  - The average moisture of steam coal produced in Luhansk region of Ukraine, in year y, %

$k$  - Hydrogen content factor of coal, d/l

100 - conversion factor from % into a fraction, d/l

4.187 - conversion factor from kilocalories to kilojoules kcal/KJ

1/1000 - - conversion factor from KJ / kg into TJ / kt

Net Calorific Value, calculated by the formula (4), is a lower value, provided by the National Inventory<sup>22</sup> is

around 10% that is why, for reasons of conservatism, the project takes on a value calculated by the formula (4).

### Leakages

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. 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). Source of the leakage 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.

As reliable and accurate national data on fugitive CH<sub>4</sub> emissions associated with the production of coal are available, project participants used this data to calculate the amount of fugitive CH<sub>4</sub> emission as described below.

This leakage is measurable: through the same procedure as used in 2006 IPCC Guidelines<sup>23</sup> (See Volume 2, Chapter 4, Page 4-11) and also used in CDM approved methodology ACM009, Version 4.0.0<sup>24</sup> (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 of Ukraine under the Kyoto Protocol) and any conversion coefficients.

Electricity consumption and related greenhouse gas emissions due to dismantling of waste heap to be taken into account in calculating the project emissions. Carbon dioxide emissions due to electricity consumption in the coal mine way in an amount, equivalent to the design of coal - a leakage, that can be taken into account at base of the

<sup>21</sup> State Standard 4083-2002. Coal and anthracite for powdered combustion in thermal power plants. Kyiv. State Standard of Ukraine 2002. The standard will be provided by an independent expert organization.

<sup>22</sup> National Inventory Report of anthropogenic emissions by sources and removals by sinks of greenhouse gases in the Ukraine 1990- 2010, p. 456, 462, 468

<sup>23</sup> [http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2\\_Volume2/V2\\_4\\_Ch4\\_Fugitive\\_Emissions.pdf](http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf)

<sup>24</sup> <http://cdm.unfccc.int/methodologies/DB/49516CYT8X8LZ3F4YRXKSIHRXMOTR5>

State Statistics Committee data<sup>25</sup>, concerning unit costs of electricity at coal mines in Ukraine in the relevant year.

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. 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 methodological approach is very common and is applied in all renewable energy projects (substitution of grid electricity with renewable-source electricity), projects in cement sector (e.g. JI0144 Slag usage and switch from wet to semi-dry process at JSC “Volyn-Cement”, Ukraine<sup>26</sup>), projects in metallurgy sector (e.g. UA1000181 Implementation of Arc Furnace Steelmaking Plant "Electrostal" at Kurakhovo, Donetsk Region<sup>27</sup>) and others.

These leakages are significant and will be included in the calculation of the project emission reductions. Procedure for ex ante estimation and quantification of this source is similar to the procedure made in the project, that was determined – “Dismantling of waste heap at former mine "ROZSYPNYANSKA-1” (Project ITL UA1000317)<sup>28</sup>

Table 7 - List of constants used in the calculations of leakage

<i>Data / Parameter</i>	<i>Data unit</i>	<i>Description</i>	<i>Data Source</i>	<i>Value</i>
$GWP_{CH_4}$	tCO <sub>2</sub> e / tCH <sub>4</sub>	Global Warming Potential of Methane	IPCC Second Assessment Report <sup>29</sup> (during the the monitoring period value can be changed)	21
$\rho_{CH_4}$	t/m <sup>3</sup>	Methane density	Standard (at room temperature 20°C and 1 ATM) <sup>30</sup>	0.000668
$EF_{CH_4}$	m <sup>3</sup> /t	Emission factor for fugitive methane emissions from coal mining.	National Inventory Report of Ukraine 1990- 2009, p. 90 <sup>31</sup> (during the monitoring period value can be changed)	25.67
$N_{Coal,y}^E$	MWh/t	average electricity	Fuel and energy resources of Ukraine, Statistical Yearbook, State Statistics	2008-0.0878 2009-0.0905

<sup>25</sup> <http://www.ukrstat.gov.ua/>

<sup>26</sup>

[http://ji.unfccc.int/JI\\_Projects/DB/P1QYRYMBOCEQOT0HOQM60MBQ0HXNYU/Determination/Bureau%20Veritas%20Certification1266348915.6/viewDeterminationReport.html](http://ji.unfccc.int/JI_Projects/DB/P1QYRYMBOCEQOT0HOQM60MBQ0HXNYU/Determination/Bureau%20Veritas%20Certification1266348915.6/viewDeterminationReport.html)

<sup>27</sup> <http://ji.unfccc.int/JIITLProject/DB/4THB9WT0PK6F721UQA5H6PTHZEXT4C/details>

<sup>28</sup> <http://ji.unfccc.int/JIITLProject/DB/0RQXGLUAS7ETAGMUQZWFQPJLN1SIAW/details>

<sup>29</sup> IPCC Second Assessment: Climate Change 1995. A Report of the Intergovernmental Panel on Climate Change". Bolin, B. et al. (1995). IPCC website. <http://www.ipcc.ch/pdf/climate-changes-1995/ipcc-2nd-assessment/2nd-assessment-en.pdf>

<sup>30</sup> [http://www.engineeringtoolbox.com/gas-density-d\\_158.html](http://www.engineeringtoolbox.com/gas-density-d_158.html)

<sup>31</sup> [http://unfccc.int/files/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/application/zip/ukr-2011-nir-08jun.zip](http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/ukr-2011-nir-08jun.zip)



		consumption per tonne of coal, produced in Ukraine in the year y	Committee of Ukraine, Kiev 2009-2011 <sup>32</sup> (during the monitoring period value can be changed)	2010-0.0926 2011-0.0842 2012-0.0842
$EF_{CO_2,EL}$	tCO <sub>2</sub> /MWh	Specific carbon dioxide emissions due to production of electricity at TPP and by its consumption	Order of State Environmental Investments Agency #62, 63, 43, 75 <a href="http://www.neia.gov.ua/nature/doccata/log/document?id=127171,127172,126006,127498">http://www.neia.gov.ua/nature/doccata/log/document?id=127171, 127172, 126006, 127498</a> (during the monitoring period value can be changed)	2008 – 1.219 2009 – 1.237 2010 – 1.225 2011 – 1.227 2012 – 1.227

Leakages in year y calculated as follows:

$$LE_y = LE_{CH_4,y} + LE_{EL,y} \quad (5)$$

where:

$LE_y$  - leakages in year y, (t CO<sub>2</sub>e);

$LE_{CH_4,y}$  - leakages due to fugitive emissions of methane in the mining activities in the year y, (t CO<sub>2</sub>e);

$LE_{EL,y}$  - leakages due to consumption of electricity in the mining activities in the year y, (t CO<sub>2</sub>e).

Leakages due to fugitive emissions of methane in the mining activities in the year y calculated as follows:

$$LE_{CH_4,y} = - FC_{BE,Coal,y} \cdot EF_{CH_4} \cdot \rho_{CH_4} \cdot GWP_{CH_4} \quad (6)$$

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 because of the project activity in the year y, t, (calculated by the formula (2));

$EF_{CH_4}$  - emission factor for fugitive methane emissions from coal mining, m<sup>3</sup>/t;

$\rho_{CH_4}$  - methane density (standard, at room temperature 20 ° C and 1 atm), t/m<sup>3</sup>;

$GWP_{CH_4}$  - global warming potential for methane, tCO<sub>2</sub> e / tCH<sub>4</sub>.

Leakages due to consumption of electricity in the mining activities in the year y calculated as follows:

$$LE_{EL,y} = - FC_{BE,Coal,y} \cdot N_{Coal,y}^E \cdot EF_{CO_2,EL} \quad (7)$$

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 because of the project activity in the year y, t, (calculated by the formula (2));

$N_{Coal,y}^E$  - average electricity consumption per tonne of coal, produced in Ukraine in the year y, MWh/t

$EF_{CO_2,EL}$  - Specific carbon dioxide emissions due to production of electricity at TPP and by its consumption, tCO<sub>2</sub> e /MWh

Baseline emissions due to consumption of other types of energy in coal mines are insignificant compared to the emissions due to electricity consumption<sup>33</sup>. Due to this fact and for reasons of conservatism, take them equal to zero.

<sup>32</sup> <http://www.ukrstat.gov.ua/>

<sup>33</sup> *The effective method of electricity consumption control at coal mines. B.A.Gryaduschy, Doctor of Technical. Science, DonUGI, G.N.Lisovoy, V.I.Myalkovsky, Chehlaty NA, Cand. Science, NIIGM named M.M.Fedorov, Donetsk, Ukraine www.mishor.esco.co.ua/2005/Thesis/10.doc*

Key information and data used to establish the baseline are provided below in tabular form:

Table 8 - Amount of coal that has been mined in baseline scenario

<b>Data/Parameter</b>	$FC_{BE,Coal,y}$
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 because of the project activity in year y
Time of <u>determination/monitoring</u>	Yearly monitoring.
Source of data (to be) used	Project owner calculations
Value of data applied (for ex ante calculations/determinations)	Provided by project owner
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by the formula (2) Section B.1.
QA/QC procedures (to be) applied	According to the project owner policy.
Any comment	No

Table 9 - Amount of sorted fraction (0-30 mm)

<b>Data/Parameter</b>	$FR_{Coal,y}$
Data unit	t
Description	Amount of sorted fraction (0-30 mm), which is extracted from the dump because of the project activity in the year y
Time of <u>determination/monitoring</u>	Yearly monitoring.
Source of data (to be) used	Project owner records
Value of data applied (for ex ante calculations/determinations)	Provided by project owner
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measured for the commercial purposes on site.
QA/QC procedures (to be) applied	According to the project owner policy.
Any comment	No



Table 10 - Average ash content of sorted fraction

<b>Data/Parameter</b>	$A_{Rock,y}$
Data unit	%
Description	Average ash content of sorted fraction (0-30 mm), which is extracted from dump in year y
Time of <u>determination/monitoring</u>	Yearly monitoring.
Source of data (to be) used	Project owner records
Value of data applied (for ex ante calculations/determinations)	Provided by project owner
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measured for the commercial purposes on site.
QA/QC procedures (to be) applied	According to the project owner policy.
Any comment	No

Table 11 - Average humidity of sorted fraction

<b>Data/Parameter</b>	$W_{Rock,y}$
Data unit	%
Description	Average humidity of sorted fraction (0-30mm), which is extracted from dump in year y
Time of determination/monitoring	Yearly monitoring.
Source of data (to be) used	Project owner records
Value of data applied (for ex ante calculations/determinations)	Project owner records
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measured for the commercial purposes on site.
QA/QC procedures (to be) applied	According to the project owner policy.
Any comment	No



Table 12 - Net Calorific Value of coal

<b>Data/Parameter</b>	<i>NCV<sub>Coal</sub></i>
Data unit	TJ/kt
Description	Net Calorific Value of coal
Time of determination/ <u>monitoring</u>	Annual monitoring
Source of data (to be) used	Calculations of project owner
Value of data applied (for ex ante calculations/determinations)	Project owner records
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by the formula (4). Section B1
QA/QC procedures (to be) applied	According to the project owner policy
Any comment	Annual monitoring

Table 13 - High Calorific Value of steam coal

<b>Data/Parameter</b>	<i>HCV<sub>Coal</sub></i>
Data unit	kcal/kg
Description	High Calorific Value of steam coal
Time of determination/monitoring	Fixed ex ante.
Source of data (to be) used	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine
Value of data applied (for ex ante calculations/determinations)	2008-8074 2009-7641 2010-7641 2011-7641 2012-7641
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The default value is set according to the Guide, Ministry of Coal Industry of Ukraine, State Committee of Ukraine
QA/QC procedures (to be) applied	According to the Guide, Ministry of Coal Industry of Ukraine, State Committee of Ukraine
Any comment	No



Table 14 - Carbon Oxidation factor of coal

<b>Data/Parameter</b>	$OXID_{Coal}$
Data unit	d/l
Description	Carbon Oxidation factor of coal
Time of determination/monitoring	Fixed ex ante.
Source of data (to be) used	National Inventory Report of Ukraine 1990- 2010., p. 459,465,471 (in the monitoring period the value can be changed)
Value of data applied (for ex ante calculations/determinations)	2008-0.963 2009-0.963 2010-0.962 2011-0.962 2012-0.962
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The default value is set according to the National Inventory.
QA/QC procedures (to be) applied	According to the National Inventory.
Any comment	No

Table 15 - Carbon content of coal

<b>Data/Parameter</b>	$K_{coal}^c$
Data unit	tC/TJ
Description	Carbon content of coal
Time of determination/monitoring	Fixed ex ante.
Source of data (to be) used	National Inventory Report of Ukraine 1990- 2010., p. 458, 464,470 (in the monitoring period the value can be changed)
Value of data applied (for ex ante calculations/determinations)	2008-25.95 2009-25.97 2010-25.99 2011-25.99 2012-25.99
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The default value is set according to the National Inventory.
QA/QC procedures (to be) applied	According to the National Inventory.
Any comment	No



Table 16 - Probability of waste heap burning.

<b>Data/Parameter</b>	$p_{WHB}$
Data unit	d/l
Description	Probability of waste heap burning.
Time of determination/monitoring	Fixed ex ante.
Source of data (to be) used	Report on the analyzing the fire danger of waste heaps in Luhansk region, Scientific Research Institute "Respirator", Donetsk, 2012.
Value of data applied (for ex ante calculations/determinations)	0.78
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The default value is set according to the Scientific Research Institute "Respirator"
QA/QC procedures (to be) applied	According to the Scientific Research Institute "Respirator"
Any comment	No

Table 17 - Average ash content of steam coal

<b>Data/Parameter</b>	$A_{Coal}$
Data unit	%
Description	Average ash content of steam coal that is mined in the Luhansk region of Ukraine
Time of <u>determination/monitoring</u>	Fixed ex ante.
Source of data (to be) 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 Appendix 4)
Value of data applied (for ex ante calculations/determinations)	2008-37.20 2009-38.40 2010-38.10 2011-38.10 2012-38.10
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The default value established in accordance with Guide Ministry of Coal Industry of Ukraine, State Committee of Ukraine.
QA/QC procedures (to be) applied	According to Guide Ministry of Coal Industry of Ukraine, State Committee of Ukraine
Any comment	No



Table 18 - Humidity of steam coal

Data/Parameter	$W_{Coal}$
Data unit	%
Description	Average humidity of steam coal that is mined in the Luhansk region of Ukraine
Time of determination/monitoring	Fixed ex ante.
Source of data (to be) 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 Appendix 4)
Value of data applied (for ex ante calculations/determinations)	2008-7.20 2009-7.40 2010-7.40 2011- 7.40 2012-7.40
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The default value established in accordance with Guide Ministry of Coal Industry of Ukraine, State Committee of Ukraine.
QA/QC procedures (to be) applied	According to Guide Ministry of Coal Industry of Ukraine, State Committee of Ukraine
Any comment	No

Table 19 - Hydrogen content factor of coal

Data/Parameter	$k$
Data unit	d/l
Description	Hydrogen content factor of coal
Time of determination/monitoring	Fixed ex ante.
Source of data (to be) used	State Standard 4083-2002. Coal and anthracite for powdered combustion in thermal power plants. Kyiv. State Standard of Ukraine 2002.
Value of data applied (for ex ante calculations/determinations)	0.21
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The default value established in accordance with State Standard 4083-2002
QA/QC procedures (to be) applied	According to State Standard 4083-2002
Any comment	No

**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 following step-wise approach is used to demonstrate that the project provides reductions in emissions by sources that are additional to any that would otherwise occur:

**Step 1. Indication and description of the approach applied**

As suggested by Paragraph 44 (b) of the Annex 1 of JISC "Guidance on Criteria for Baseline Setting and Monitoring" Version 03, the approach to demonstrate additionality will consist of provision of traceable and transparent information that an accredited independent entity has already positively determined that a comparable project (to be) implemented under comparable circumstances (same GHG mitigation measure, same country, similar technology, similar scale) would result in a reduction of anthropogenic emissions by sources or an enhancement of net anthropogenic removals by sinks that is additional to any that would otherwise occur and a justification why this determination is relevant for the project at hand.

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

The following steps are taken in order to demonstrate additionality of this project:

*Step 1: Identify comparable project where an accredited independent entity has already positively determined that it would result in a reduction of anthropogenic emissions by sources or an enhancement of net anthropogenic removals by sinks that is additional to any that would otherwise occur.*

The project "WASTE HEAPS #9, #11, #17, #25 DISMANTLING OF MINES #4 AND #29 WITH THE AIM OF DECREASING GREENHOUSE GASES EMISSIONS INTO THE ATMOSPHERE"<sup>34</sup> is selected as the comparable JI project. Accredited independent entity<sup>35</sup> has already positively determined that it would result in a reduction of anthropogenic emissions by sources or an enhancement of net anthropogenic removals by sinks that is additional to any that would otherwise occur. This determination has already been deemed final by the JISC. Appropriate documentation such as PDD and Determination Report regarding this project is available traceably and transparently on the UNFCCC JI Website

*Step 2: Demonstrate that the identified project is a comparable project (to be) implemented under comparable circumstances:*

- 1) Both projects propose **same GHG mitigation measure**: The proposed GHG mitigation measure under both projects is coal extraction from the mine's waste heaps. This 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.
- 2) Both projects are implemented within the **same country in the same time period**: The proposed project and identified comparable project are both located in Ukraine. The time interval between the start of two projects is less than 1 year, therefore meets the criteria of Article 12 (b) "Guidance on Criteria for Baseline Setting and Monitoring", Version 03.
- 3) Both projects utilize **similar technology**: The technology utilized by the proposed project and identified comparable project is similar. In both projects the waste heap is dismantled using standard loaders and bulldozers. From dumps the material is sent to a site of sorting. In both projects there is sorting complex, in which the division of carbonaceous rocks into fractions by vibrating occurs. Small fraction at both projects is used for subsequent combustion in local boiler and power station. Therefore, both technologies are similar.
- 4) Both projects have **similar scale**: Both projects are large scale JI projects. Both projects process waste heaps of comparable scale. The scale of remote coal is limited by content of coal in dumps and the size of dump and similar to the proposed and comparable projects - in both projects the quantity of sorted fractions is ranging from

<sup>34</sup> <http://ji.unfccc.int/JIITLProject/DB/EI59E07OYN532PQ3GON9THLDADAWW/details>

<sup>35</sup> <http://ji.unfccc.int/UserManagement/FileStorage/I5CETNLX3YKUGQAF8ZBVMHS4DR1W0J>



1 080 000 to 1 420 000 t per year (see tTable 20) as in the comparable project (see Section B.2, PDD)<sup>36</sup>. Thus, the average amount of processing in both projects does not differ by more than 50%, and therefore meets the requirements of the Guidance.

Table 20 - Quantity of extracted fraction (0-30mm) in proposed and comparable projects.

	2008	2009	2010	2011	2012
Quantity of extracted fraction (0-30mm) in the proposed project (t/year)	1136724	1249637	1267481	1253159	1250000
Quantity of extracted fraction (0-30mm) in in the comparable project (t/year)	1080235	1380903	1414897	1397024	1400000
correlation of factions in both projects (d/l)	1.05	0.9	0.9	0.9	0.89

5) During the period between the beginning of the proposed and the compared projects changes in legislation that could affect the establishment of the baseline didn't take place.

Therefore, the criteria identified by the Guidance are satisfied and the identified project is indeed a comparable project implemented under comparable circumstances.

**Step 3: Provide justification why determination for a comparable project is relevant for the project at hand .**

The project project ““WASTE HEAPS #9, #11, #17, #25DISMANTLING OF MINES #4 AND #29 WITHTHE AIM OF DECREASING GREENHOUSE GASES EMISSIONS INTO THE ATMOSPHERE” and the proposed project are both implemented within the same geographic region of Ukraine – the Donbas coal mining region. The implementation timeline is quite similar: Kyoto period (2008-2012) is a period where a most extensive work in both projects is carried out.

Both projects will share the same investment profile and market environment. These two projects are implemented by private companies with no utilization of public funds. The investment climate will be comparable in both cases with the coal sector being an almost non-profitable sector in Ukraine<sup>37</sup> burdened by many problems. The market for the extracted coal will also be similar for both projects as these are small private companies that will not be able to sell coal in big quantities under long-term contracts. Ukrainian coal sector is largely state-controlled. Energy and Coal Ministry of Ukraine decides production level of state mines, based on their performance. After this, state controlled mines sell their coal to the state Trading Company "Coal of Ukraine". This company also buys coal from private mines and arranges supply of coal to thermal electricity companies. Prices for coal mines differ significantly for public and private mines. In general, prices of state mines are more than 60% higher than the prices for private enterprises<sup>38</sup>.

Both projects also share the investment climate of Ukraine which is far from being favourable. Ukraine is considered to be a high risk country for doing business and investing in. Almost no private capital is available from domestic or international capital markets for mid to long term investments, and any capital that is available has high cost. The table below represents risks of doing business in Ukraine according to various international indexes and studies.

<sup>36</sup> <http://ji.unfccc.int/UserManagement/FileStorage/4ORS6EF8G70ZY5DCK3VB1LTPNAUQMW>

<sup>37</sup> [http://www.necu.org.ua/wp-content/plugins/wp-download\\_monitor/download.php?id=126](http://www.necu.org.ua/wp-content/plugins/wp-download_monitor/download.php?id=126)

<sup>38</sup> [http://www.ier.com.ua/files/publications/Policy\\_papers/German\\_advisory\\_group/2009/PP\\_09\\_2009\\_ukr.pdf](http://www.ier.com.ua/files/publications/Policy_papers/German_advisory_group/2009/PP_09_2009_ukr.pdf)

Table 21 - International ratings of Ukraine<sup>39</sup>

Organization, which provides rating	Name of rating	Ukraine's place in the rating	Number of countries in the rating
Fung Heritage (2010)	Economic Freedom Rating	162	179
Pro UN (2009)	The Human Development Index	85	182
Transparency International (2009)	Index of corruption	146	180
Freedom House (2009)	freedom of Speech	115	195
World Bank, The International Finance Corporation and the Audit Company Price Waterhouse Coopers (2010)	Rating of ease of paying taxes	181	183
World Economic Forum (Davos) (2009-2010)	Rating of global competitiveness	82	133
World Economic Forum (Davos) (2009)	Financial strength rating	55	55
“Alliance for Property Rights” (USA)	Rating of property rights protection	58	70

The data above shows that both real and perceived risks of investing in Ukraine are in place and influence the availability of capital in Ukraine both in terms of size of the investments and in terms of capital costs. The comparison of commercial lending rates in Ukraine and in Eurozone for the loans over 5 years in EUR is presented in a figure below:

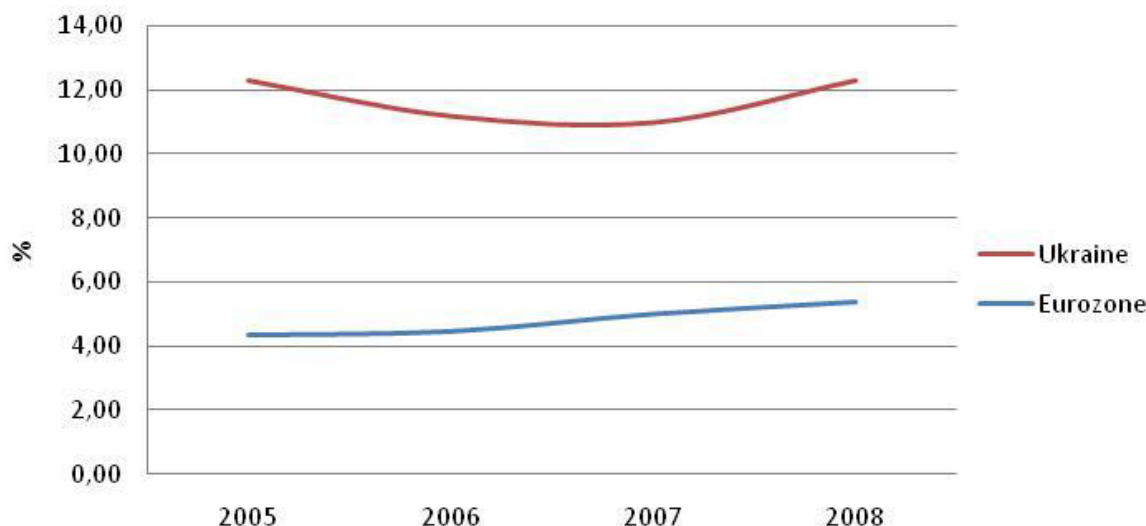


Figure 5 - Commercial lending rates, EUR, over 4 years<sup>40</sup>

Cost of debt financing in Ukraine is at least twice as high than in the Eurozone. The risks of investing into Ukraine are additionally confirmed by the country ratings provided by the “Moody’s international rating” agency and the associated country risk premium. The table below compares country risk premiums for Russia and Ukraine<sup>41</sup>:

<sup>39</sup> [http://sd.net.ua/2010/06/11/ukraine\\_ratings.html](http://sd.net.ua/2010/06/11/ukraine_ratings.html)

<sup>40</sup> Data for Ukraine from National Bank of Ukraine [http://www.bank.gov.ua/Statist/Electronic%20bulletin/data/4-Financial%20markets\(4.1\).xls](http://www.bank.gov.ua/Statist/Electronic%20bulletin/data/4-Financial%20markets(4.1).xls)

<sup>41</sup>Data from Aswath Damodaran, Ph.D., Stern School of Business NYU <http://pages.stern.nyu.edu/~adamodar/>



Table 22 - Sovereign Awards for Russia and Ukraine in 2004-2006

Total Risk Premium, %	2004	2005	2006
Russia	7.02	6.6	6.64
Ukraine	11.59	10.8	10.16

As stated at the OECD Roundtable on Enterprise Development and Investment Climate in Ukraine, the current legal basis is not only inadequate, but to a large extent it sabotages the development of market economy in Ukraine. Voices in the western press can basically be summarized as follows: The reforms in the tax and legal systems have improved considerably with the adoption of the commercial Code, Civil Code and Customs Code on 1 January 2004 but still contain unsatisfactory elements and pose a risk for foreign investors<sup>42</sup>. Ukraine is considered to be heading in the right direction with significant reforms having been put into action but still has a long way to go to realize its full potential. Frequent and unpredictable changes in the legal system along with conflicting and inconsistent Civil and Commercial Codes do not allow for a transparent and stable enforced legal business environment. This is perceived as a great source of uncertainty by international companies, which make future predictions of business goals and strategy risky.

The conclusion from the abovementioned is as follows: the investment climate of Ukraine is risky and unwelcoming, private capital is not available from domestic or international sources or available at prohibitively high cost due to real and perceived risks of doing business in Ukraine as shown by various sources. Alternatives markets, such as Russia, offer similar profile of investment opportunities with lower risk and better business environment.

Taking into account the information provided above it is possible to conclude that the determination of the project “WASTE HEAPS #9, #11, #17, #25DISMANTLING OF MINES #4 AND #29 WITHTHE AIM OF DECREASING GREENHOUSE GASES EMISSIONS INTO THE ATMOSPHERE” is relevant for the project at hand.

**Outcome of the analysis:** We have provided traceable and transparent information that an accredited independent entity has already positively determined that a comparable project “Dismantling of waste heap at former mine “WASTE HEAPS #9, #11, #17, #25DISMANTLING OF MINES #4 AND #29 WITHTHE AIM OF DECREASING GREENHOUSE GASES EMISSIONS INTO THE ATMOSPHERE” implemented under comparable circumstances (same GHG mitigation measure, same country, similar technology, similar scale) would result in a reduction of anthropogenic emissions by sources or an enhancement of net anthropogenic removals by sinks that is additional to any that would otherwise occur and have provided justification on why this determination is relevant for the project at hand. Therefore, this project is additional.

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

Project implementation will take place only on dumps, which are officially is in use by “CE ‘GOSPODAR” Ltd At the same time, according to baseline, the notional typical mine, which produces coal, replaced by the coal from dismantling of heap, takes part in fugitive emissions. The specific of energy consumption at coal mines is determined by the following main components: power consumption, heat consumption, air consumption, consumption of natural gas and other types of fuel and water, sewage discharges, sewage treatment. As a result of the work<sup>43</sup> is found, that about 90% of the total consumption of energy in coal mines is electricity.

There are several sources of greenhouse gases due to mining:

- Uncontrolled methane emissions as a result of working the coal industry in Ukraine;
- Carbon dioxide emissions due to electricity consumption at the mine;
- Emissions of carbon dioxide due to burning of the new dumps formed due to mining;
- Carbon dioxide emissions due to consumption of other types of fuel at the mine (given the small number and for reasons of conservatism is not considered);

<sup>42</sup> Foreign Direct Investment in Ukraine – Donbass, Philip Burris, Problems of foreign economic relations development and attraction of foreign investments: regional aspect., ISSN 1991-3524, Donetsk, 2007. p. 507-510

<sup>43</sup> The effective method of electricity consumption control at coal mines. B.A.Gryaduschy, Doctor of Technical. Science, DonUGI, G.N.Lisovoy, V.I.Myalkovsky, Chehlaty NA, Cand. Science, NIIGM named M.M.Fedorov, Donetsk, Ukraine [www.mishor.esco.co.ua/2005/Thesis/10.doc](http://www.mishor.esco.co.ua/2005/Thesis/10.doc)

Carbon dioxide emissions due to consumption of electricity produced by burning fossil fuels in power plants of Ukraine and uncontrolled methane emissions as a result of mining activity, are leakages .  
The table 23 shows an overview of all sources of emissions in the baseline and project scenarios. The project boundaries depicted in accordance with the provisions of Articles 14, 16, 17 Guidelines Supervisory Committee.

Table 23 - Sources of emissions in the baseline and project scenario.

Baseline scenario	Source	Gas	Included/ Excluded	Justification / Explanation
	Waste heap burning	CO <sub>2e</sub>	Included	Main emission source
	Coal consumption	CO <sub>2e</sub>	Excluded	This coal is displaced in the project activity by the coal extracted from the waste heaps.
Project scenario	Coal consumption	CO <sub>2e</sub>	Excluded	The coal is extracted from waste heap.
	Consumption of electricity due to extracting coal from dump	CO <sub>2e</sub>	Included	Main emission source.
	Consumption of fossil fuel(diesel fuel) due to extracting coal from dumps	CO <sub>2e</sub>	Included	Main emission source.
Leakages	Emissions of methane as a result of the coal industry	CH <sub>4</sub>	Included	These leaks are taking place in the baseline scenario associated with the uncontrolled emissions of methane in the mine
	Consumption of electricity due to mining	CO <sub>2e</sub>	Included	These leaks are taking place in the baseline scenario associated with the mining
	Use of other types of energy resources due to mining	CO <sub>2e</sub>	Excluded	These emissions are not significant <sup>44</sup> ,and also for reasons of conservatism, they are excluded from consideration.

### The baseline scenario

The baseline scenario scenario is the continuation of the current situation. Coal is mined in underground mines, which causes uncontrolled methane emissions. When coal is consumed electricity and other fuels. Coal is used for energy production. In the process of coal formed a new blade. Dumps heat and often light up, resulting in emissions of carbon dioxide in the atmosphere. The sources of emissions in the baseline scenario are:

- Emissions of carbon dioxide due to burning of coal dump;
- The sources of leakages are:
- Uncontrolled methane emissions due to coal mining in the mines;
- Emissions of carbon dioxide due to consumption of electricity and other forms of energy in coal mining in the mine.

### Project scenario

By the project scenario dumps are dismantled, and all combustible materials are removed. Thus, emissions due to ignition and burning dumps are reduced. Project implementation includes additional burning diesel fuel due to supply the rock from dumps to the sorting point of coal. For operation of the equipment the electricity is used.

<sup>44</sup> The effective method of electricity consumption control at coal mines. B.A.Gryaduschy, Doctor of Technical Science, DonUGI, G.N.Lisovoy, V.I.Myalkovsky, Chehlaty NA, Cand. Science, NIIGM named M.M.Fedorov, Donetsk, Ukraine [www.mishor.esco.co.ua/2005/Thesis/10.doc](http://www.mishor.esco.co.ua/2005/Thesis/10.doc)

Additional amount of coal obtained from the project, reduced the need for its production in the mines. The sources of emissions in the project scenario are:

- Emissions of carbon dioxide from the use of fuel for the operation of the project equipment (tecnicos);
- Emissions of carbon dioxide associated with electricity consumption of project equipment;

The following figures show the project boundaries and sources of emissions in the baseline and project scenarios:

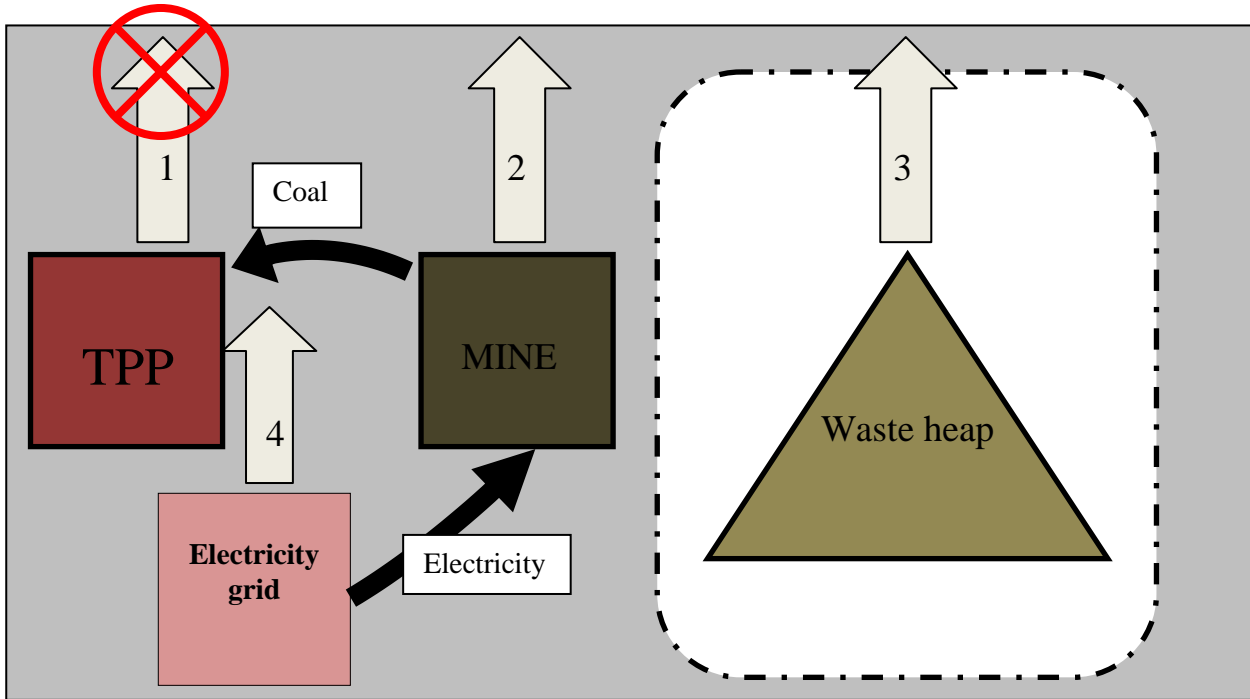


Figure 6 - The boundaries of the project and the sources of emissions in the baseline scenario



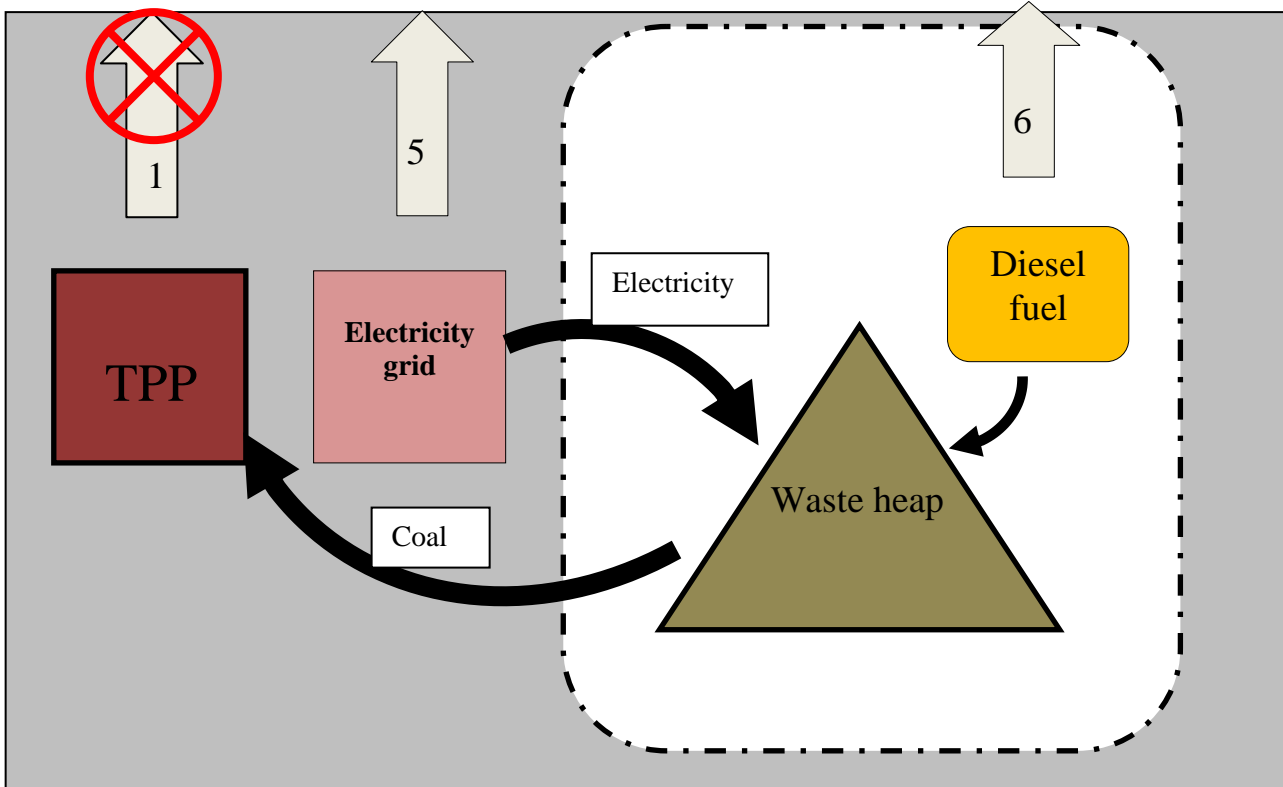
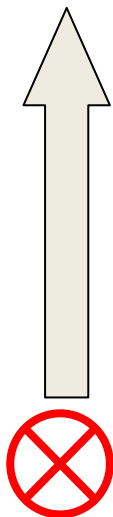



Figure 7 - The boundaries of the project and the source of emissions in the project scenario

#### Sources of greenhouse gas emissions at schemes

- 
1. Carbon dioxide due to burning of coal
  2. Leakages of methane due to mining
  3. Carbon dioxide due to burning coal
  4. Leakages of carbon dioxide due to consumption of electricity in mine.
  5. Carbon dioxide due to consumption of electricity during dismantling the dump.
  6. Carbon dioxide due to consumption of diesel fuel during dismantling the dump
-  Emissions due to burning of coal excluded from consideration

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

Date of determination the baseline scenario: 07/12/2012

Name of person / organization, determining the baseline scenario:

Klavinsh Gints, Project manager at SIA "Vidzeme Eko", tel.+371-29228458, e-mail: [siltisilti@gmail.com](mailto:siltisilti@gmail.com)

"Vidzeme Eko" – project participant , contact details are available in Annex 1.

**SECTION C. Duration of the project / crediting period****C.1. Starting date of the project:**

The date of commencement of the project is January 22, 2008 (from this date the installation of equipment begins according to the order of installation works implementation # 178/08 from 21/01/2008).

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

The life cycle of the project will last from 18/02/2008 to 31/12/2012. Thus, the project life cycle is 4 years 10 months or 58 months.

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

Four years ten months (58 month). From 18/02/2008 to 31/12/2012. On 18/02/2008 begins generation of first emission reductions in the project.

**SECTION D. Monitoring plan****D.1. Description of monitoring plan chosen:**

The proposed monitoring procedures coincide with standard procedures in projects that were determined: SIA “Antracit”, SIA “Monolit”, “Temp” Ltd and others. The projects developer is Global Carbon BV.

In order to provide a detailed description of the monitoring plan chosen, a step-wise approach is used:

***Step 1. Indication and description of the approach chosen for realizing of monitoring.***

Option (a) provided by the Guidelines For The Users Of The Joint Implementation Project Design Document Form, Version 04<sup>45</sup> is used: JI specific approach is used in this project and therefore will be used for establishment of monitoring plan.

Among other things, the monitoring plan includes the following:

- Collecting and archiving all relevant data needed for evaluation and measurement of anthropogenic emissions by sources of emissions that occur within the project during the crediting period;
- Collecting and archiving all relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project during the crediting period;
- Identify all potential sources and collect and archive data regarding the enhancement the level of anthropogenic emissions by sources of emissions outside the project, which is significant and which can be attributed to the project during the crediting period.
- Procedures to ensure quality control and process monitoring;
- Procedures for periodic calculation reductions of anthropogenic emissions from sources in the proposed JI project, and procedures for calculating the effects of leakage, if any.

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

All data collected during monitoring should be archived and stored for at least 2 years after the last application for ERU.

These should be checked, unless otherwise indicated in the following sections. All measurements must be executed with calibrated measurement equipment according to industry standards for the branch.

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<sup>45</sup> <http://ji.unfccc.int/Ref/Documents/Guidelines.pdf>

***Baseline scenario***

The baseline scenario is the continuation of the current situation. Coal is mined in underground mines, which causes uncontrolled methane emissions. Due to mining the electricity and other types of fuel are consumed. Coal is used for energy production. A new dump formed in the process of coal mining. Dumps are heated and often are ignited, resulting in emissions of carbon dioxide in the atmosphere.

The sources of emissions in the baseline scenario are:

-Emissions of carbon dioxide due to burning of coal dump;

The sources of leakages are:

-Uncontrolled methane emissions due to coal mining in the mines;

-Emissions of carbon dioxide due to consumption of electricity and other forms of energy in coal mining in the mine.

***Project scenario***

In the project scenario dumps are dismantled, and all combustible materials are removed. Thus, emissions due to ignition and burning dumps are reduced. Project implementation includes additional burning diesel fuel to supply the mining of rock dumps to the point of sorting coal. For operation of the equipment the electricity is used. Additional coal obtained from the project, reducing the need for its production in the mines. The sources of emissions in the project scenario are:

- Emissions of carbon dioxide due to consumption of fuel for the operation of the project equipment (mining machinery);

- Emissions of carbon dioxide due to consumption of electricity by project equipment;

During any period of monitoring must be collected and recorded data on the following parameters:

**1. Additional electricity consumed in the same period as a result of implementation of project activities**

To measure this parameter the commercial data of company are used. Also monthly electricity bills are available. This parameter is recorded by special energy meter. Meter is located in the buildings of substation near the project location. The meter records all electricity consumed in the project because access to the electricity supply is only through it. Indications used for commercial accounts with energetic company. Account checking is made on the basis of theoretical calculation of sorting complex power consumption according to the technical characteristics and timing of work time.

**2. Amount of diesel fuel was consumed in the appropriate period as a result of a project activity.**

To determine this parameter the commercial data of company are used. To confirm the consumed amount of fuel checks and other accounting documents are used. The fuel consumption, which is related to a project activity, is taken into account. Information summary report is based on accounts. In the industrial site there is not any additional equipment, but if such equipment is used, fuel consumption of this equipment is also considered. If the data in these documents are in



litres instead of tonnes, these data must be converted using factor of 0.85 kg / l<sup>46</sup>. For purpose of control a theoretical calculation of diesel fuel consumption is made on basis of technical specifications and actual record of machinery work.

**3. Amount of coal, which is in the appropriate period was extracted from the dump and combusted for obtaining the energy, used for activities under the project, equal to the amount of coal that was in the baseline scenario produced from the mine and combusted for obtaining the energy.**

### **3.1. Amount of fraction (0-30mm).**

To determine this parameter the commercial data of company are used. To confirm the amount of fraction (0-30 mm) checks and documents from customers are used. Taken into account and refers to the project activity only product which delivered to the customer. Weighing takes place on site using certified scales. Regular cross-inspections with customers are executed. Information of summarized reports is based on these delivery data.

### **3.2. Ash content and moisture of fraction (0-30mm).**

Ash and moisture content of fraction (0-30m) is determined on the basis of laboratory data as a third party of the project. For sampling for further analysis of ash content and moisture the following procedure is realized:

On-site interim storage at achieving volume fraction of about 100 tons sampling is made around the perimeter of the accumulated volume. Total volume of the collected sample is approximately 10-15 kg. Selected sample is brought and treated by Technical Control Division (TCD). Sample is treated at upgraded LSM (Laboratory Sample-processing Machine). The sample is crushed to the size of 0-3 mm. Then it is imparted to a conic form and reduced by divisor (this process is carried out three times) until the sample weight becomes below 2-3 kg. Then the sample is pressed to a disk with thickness of 2 cm and covered tightly with bars to divide into squares. Then in a chessboard order the sample is gathered with weight not less than 500 grams. Then two accompanying certificate are written, which will include:

- Number of certificate; - Date; - Mark, class; - Supplier; - Name of the desired analysis.

One certificate is placed in the can with sample. The second is attached to the can using special threads or wires. The lid closed so that the eyes of lid and cans are combined. Wire fastened into two bundles and sealed, so that it has not silted. Usually two cans are used:

- One - into the lab for testing;

- Second - to arbitration for two months storage.

Ash content and moisture of fraction (0-30mm) measured regularly with registration decade reports.

To measure the ash content and humidity of sorted fractions (0-30mm)- is used procedure in GOST 11022-95 " Solid mineral fuel. Methods for determining the ash content"<sup>47</sup>, and GOST 11014-2001 " Brown coal, hard coal and oil shale. Rapid method for determination of humidity "<sup>48</sup>. Analysis of ash content and is made in the laboratory. Acceptance inspector opens bank sample in the laboratory, verifies the identity and puts down all data in the "Journal of receiving

<sup>46</sup> GOST 305-82 Diesel Fuel. Specifications. 0,85 kg/l is taken as an average between two suggested types of diesel: summer and winter <http://elarum.ru/info/standards/gost-305-82/>

<sup>47</sup> <http://vsesnip.com/Data1/16/16768/index.htm>

<sup>48</sup> <http://vsesnip.com/Data1/40/40907/index.htm>



samples for laboratory testing ". Laboratory technician takes a sample on the analytical work, and humidity. Evaporation occurs in the low-temperature laboratory furnaces SNOL-100/350 at 160 ° C, weighing – at the laboratory electronic scales grade 4 accuracy AXIS A-2500. The process of ashing occurs in the high laboratory furnace SNOL-7, 2/1100 at 815 ° C, weighing - on the laboratory electronic scales grade 2 accuracy ANG-200C.

### Measuring devices

The method of measurement, chosen for this project, is based on the measurement of some parameters to be monitored - extracted coal and electricity consumed, and the study of accounting documents and reports on other parameters (used fuel). For measuring procedures in the project the following equipment is used (see Annex 3 as well):

- For electricity consumed - electronic counter NIK 2303ART1 # 0023512, a multifunction device for measuring electric power, accuracy 1.0 when measuring active energy in SS GOST 8.391:2008<sup>49</sup>, frequency of testing 6 years.

- For weighing the sorted fraction (0-30mm) - electronic truck gage scales VTA-60, produced by SPE "Tehnovagy" Ltd. accuracy "Medium" (III) (measurement error with standard truck load of + / - 0.25%) frequency of testing 12 months;

- To measure the ash content and moisture content of sorted fraction (0-30mm) - procedure due to GOST 11022-95 "Mineral solid fuel. Methods of determination the ash content"<sup>50</sup>, and GOST 11014-2001 "Brown coal, hard coal and oil shale. Accelerated methods for determining the moisture"<sup>51</sup>. Analysis of ash content and moisture produced in the laboratory. Acceptor unseal the can with sample in laboratory, validates the certificate and puts all data in the "History of taking samples for laboratory tests." Laboratory assistant takes the sample for analytical and work moisture. Evaporation occurs in the low-temperature laboratory furnaces SNOL-100/350 at 160 ° C, weighing is at scales of 4 laboratory accuracy AXIS A-2500. The process occurs in the laboratory furnace SNOL-7, 2/1100 at 815 ° C, weighing is carried out on the scales of 2 laboratory accuracy ANG-200C.

- To measure the fuel consumption will be using information from the accounting department: receipts for purchased fuel and accounting documents concerning the spent fuel.

### Archiving, data storage and record handling procedure

Documents and reports on the data that are monitored will be archived and stored by the project participants. The following documents will be 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 will be kept for at least two years after the last transfer of ERUs.

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<sup>49</sup> <http://lindex.net.ua/shop/bibl/501/doc/4205>

<sup>50</sup> <http://vsesnip.com/Data1/16/16768/index.htm>

<sup>51</sup> <http://vsesnip.com/Data1/40/40907/index.htm>



### **Training of monitoring personnel**

The project will utilize technology that requires skills and knowledge in heavy machinery operation, coal washing 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 will ensure 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 must be 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 will 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 will receive training on monitoring procedures and requirements. Personnel of the project host management will receive necessary training and consultations on Kyoto Protocol, JI projects and monitoring from the project participant - SIA "Vidzeme Eko".

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

In cases if any errors, fraud or inconsistencies 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. These actions occur through close cooperation with SIA "Vidzeme Eko", external "CE 'GOSPODAR'" Ltd on JI projects.

### **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.



Table 24 - List of parameters and constants used in the calculations of emissions

<i>Data / Parameter</i>	<i>Data unit</i>	<i>Description</i>	<i>Data Source</i>	<i>Value</i>
$GWP_{CH_4}$	tCO <sub>2</sub> e/ tCH <sub>4</sub>	Global Warming Potential of Methane	IPCC Second Assessment Report	21
$\rho_{CH_4}$	t/m <sup>3</sup>	Methane density	Standard (at room temperature 20°C and 1 ATM)	0.000668
$HCV_{Coal}$	kcal/kg	High Calorific Value of steam coal	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4) (during the monitoring period the value can be changed)	2008-8074 2009-7641 2010-7641 2011-7641 2012-7641
$NCV_{Diesel}$	TJ/kt	Net Calorific Value of diesel fuel	National Inventory Report of Ukraine 1990- 2010, p. 473,476, 479 (during the monitoring period the value can be changed)	2008-42.3 2009-42.5 2010-42.5 2011-42.5 2012-42.5
$OXID_{Coal}$	d/l	Carbon Oxidation factor of coal	National Inventory Report of Ukraine 1990- 2010, p.459,465,471 (during the monitoring period the value can be changed)	2008-0.963 2009-0.963 2010-0.962 2011-0.962 2012-0.962
$OXID_{Diesel}$	d/l	Carbon Oxidation factor of diesel fuel	National Inventory Report of Ukraine 1990- 2010, p. 475,478, 481 (during the monitoring period the value can be changed)	2008-0.99 2009-0.99 2010-0.99 2011-0.99 2012-0.99
$K_{coal}^c$	tC/TJ	Carbon content of coal	National Inventory Report of Ukraine 1990- 2010, p.458, 464, 470 (during the monitoring period the value can be changed)	2008-25.95 2009-25.97 2010-25.99 2011-25.99 2012-25.99

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$K_{Diesel}^c$	tC/TJ	Carbon content of diesel fuel	National Inventory Report of Ukraine 1990- 2010, p.474, 477, 480 (during the monitoring period the value can be changed)	2008-20.2 2009-20.2 2010-20.2 2011-20.2 2012-20.2
$EF_{CH4}$	m <sup>3</sup> /t	Emission factor for fugitive methane emissions from coal mining.	National Inventory Report of Ukraine 1990- 2009, p. 90	25.67
$EF_{CO2,EL}$	t CO <sub>2e</sub> /MWh	Specific carbon dioxide emissions due to production of electricity at TPP and by its consumption	Order of State Environmental Investments Agency № 62, 63, 43, 75 <a href="http://www.neia.gov.ua/nature/doccatalog/document?id=127171">http://www.neia.gov.ua/nature/doccatalog/document?id=127171</a> , 127172, 126006, 127498(during the monitoring period the value can be changed)	2008-1.219 2009-1.237 2010-1.225 2011-1.227 2012-1.227
$A_{Coal}$	%	The average ash content of coal produced in Luhansk region of Ukraine	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4) (during the monitoring period the value can be changed)	2008-37.20 2009-38.40 2010-38.10 2011-38.10 2012-38.10
$W_{Coal}$	%	The average moisture of coal produced in Luhansk region of Ukraine	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4) (during the monitoring period the value can be changed)	2008-7.20 2009-7.40 2010-7.40 2011-7.40 2012-7.40
$p_{WHB}$	d/l	Probability of waste heap burning.	<i>Report on the analyzing the fire danger of waste heaps in Luhansk region</i> , Scientific Research Institute “Respirator”, Donetsk, 2012.	0.78
$N_{Coal,y}^E$	MWh/t	average electricity consumption per tonne of coal, produced in Ukraine in the year y	Fuel and energy resources of Ukraine, Statistical Yearbook, State Statistics Committee of Ukraine, Kiev, 2009-2011.	2008-0.0878 2009-0.0905 2010-0.0926 2011-0.0842 2012-0.0842
$k$	d/l	Hydrogen content factor of coal	State Standard 4083-2002. Coal and anthracite for powdered combustion in thermal power plants. Kyiv. State Standard of Ukraine 2002. The standard will be provided by an independent expert organization.	0.21

**D.1.1. Option 1 – Monitoring of the emissions in the project scenario and the baseline scenario:****D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:**

ID number (Please use numbers to ease cross-referencing to D.2.)	Data variable	Source of data	Data unit	Measure d (m), calculate d (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
P1	$EC_{PE,y}$ – Additional amount of electricity, consumed in project in year y	Company records, electricity meters	MWh	M	Monthly	100%	In paper and electronic form	
P2	$FC_{PE,Diesel,y}$ – Amount of diesel fuel, consumed in project in year y	Company records	t	C	Monthly	100%	In paper and electronic form	
P3	$EF_{CO_2,EL}$ - Specific carbon dioxide emissions due to production of electricity at TPP and by its consumption	See section D.1. Fixed ex ante	tC/MWh	E	Fixed ex ante	100%	In electronic form	
P4	$NCV_{Diesel}$ – Net Calorific Value of diesel fuel	See section D.1. Fixed ex ante	TJ/kt	E	Fixed ex ante	100%	In electronic form	
P5	$OXID_{Diesel}$ - Carbon Oxidation factor of diesel fuel	See section D.1. Fixed ex ante	d/l	E	Fixed ex ante	100%	In electronic form	
P6	$K_{Diesel}^C$ - Carbon content of diesel fuel	See section D.1. Fixed ex ante	tC/TJ	E	Fixed ex ante	100%	In electronic form	

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**D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO<sub>2</sub> equivalent):**

Emissions from the project activity are calculated as follows:

$$PE_y = PE_{EL,y} + PE_{Diesel,y} \quad (8)$$

where:

$PE_y$  - project emissions due to project activity in the year  $y$  ( tCO<sub>2</sub> equivalent),

$PE_{EL,y}$  - project emissions due to consumption of electricity from the grid by the project activity in the year  $y$  (tCO<sub>2</sub> equivalent),

$PE_{Diesel,y}$  - project emissions due to consumption of diesel fuel by the project activity in the year  $y$  (tCO<sub>2</sub> equivalent).

The Project emissions due to consumption of electricity from a grid in a year  $y$  are calculated as follows:

$$PE_{EL,y} = EC_{PE,y} \cdot EF_{CO_2,EL} \quad (9)$$

where:

$EC_{PE,y}$  - additional amount of electricity, consumed in project in year  $y$ , MWh;

$EF_{CO_2,EL}$  - Specific carbon dioxide emissions due to production of electricity at TPP and by its consumption, tCO<sub>2</sub>/MWh;

Project emissions due to consumption of diesel fuel by the project activity in the year  $y$  are calculated as follows:

$$PE_{Diesel,y} = \frac{FC_{PE,Diesel,y}}{1000} \cdot NCV_{Diesel} \cdot OXID_{Diesel} \cdot K_{Diesel}^C \cdot 44/12, \quad (10)$$

where:

$FC_{PE,Diesel,y}$  - amount of diesel fuel, consumed in project in year  $y$ , t;

$NCV_{Diesel}$  - Net Calorific Value of diesel fuel, TJ/kt;

$OXID_{Diesel}$  - carbon Oxidation factor of diesel fuel, d/l;

$K_{Diesel}^C$  - carbon content of diesel, tC/TJ;

44/12 - stoichiometric relationship between the molecular weight of carbon dioxide and carbon.

1/1000 - conversion factor from tons in kilotonnes, d / l



<b>D.1.1.3. Relevant data necessary for determining the <u>baseline</u> of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:</b>								
<b>ID number (Please use numbers to ease cross-referencing to D.2.)</b>	<b>Data variable</b>	<b>Source of data</b>	<b>Data unit</b>	<b>Measured (m), calculated (c), estimated (e)</b>	<b>Recording frequency</b>	<b>Proportion of data to be monitored</b>	<b>How will the data be archived (electronic/paper)?</b>	<b>Comment</b>
<i>B1</i>	$FC_{BE,Coal,y}$ - Amount of coal that has been mined in the baseline scenario and combusted for energy use in year y	Company records	t	<i>C</i>	Annually	100%	In paper and electronic form	Equil $FC_{PE,Coal,y}$ Calculated using formula (2)
<i>B2</i>	$FR_{Coal,y}$ - amount of sorted fraction (0-30mm), which is extracted from the dumps because of the project activity in a year y	Company records, scales	t	<i>M</i>	Permanently at boot	100%	In paper and electronic form	
<i>B3</i>	$HCV_{Coal}$ - High Calorific Value of coal	See section D.1. Fixed ex ante	kcal/kg	<i>O</i>	Fixed ex ante	100%	In electronic form	
<i>B4</i>	$NCV_{Coal}$ - Net Calorific Value of coal	Company records	TJ/kt	<i>P</i>	Annually	100%	In paper and electronic form	Calculated using formula (14)

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B5	$OXID_{Coal}$ - Carbon Oxidation factor of coal	See section D.1. Fixed ex ante	d/l	E	Fixed ex ante	100%	In electronic form	
B6	$K_{coal}^c$ - Carbon content of coal	See section D.1. Fixed ex ante	tC/TJ	E	Fixed ex ante	100%	In electronic form	
B7	$p_{WHB}$ - Probability of waste heap burning	See section D.1. Fixed ex ante	d/l	E	Fixed ex ante	100%	In electronic form	
B8	$A_{Coal}$ - The average ash content of coal produced in Luhansk region of Ukraine	See section D.1. Fixed ex ante	%	E	Fixed ex ante	100%	In electronic form	
B9	$W_{Coal}$ - The average humidity of coal produced in Luhansk region of Ukraine	See section D.1. Fixed ex ante	%	E	Fixed ex ante	100%	In electronic form	
B10	$A_{Rock,y}$ - The average ash content of sorted fractions (0-30mm), which is extracted from dump in year y	Company records	%	M	Monthly	100%	In paper and electronic form	Laboratory data
B11	$W_{Rock,y}$ - The average humidity of sorted fractions (0-30mm), which is extracted from dump in year y	Company records	%	M	Monthly	100%	In paper and electronic form	Laboratory data
B12	k- Hydrogen content factor of coal	See section D.1. Fixed ex ante	d/l	E	Fixed ex ante	100%	In electronic form	

**D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO<sub>2</sub> equivalent):**

Emissions in the baseline scenario are calculated as follows:

$$BE_y = BE_{WHB,y} \quad , \quad (11)$$

Where:

$BE_y$  – baseline emissions in the year y (tCO<sub>2</sub> equivalent),

$BE_{WHB,y}$  - baseline emissions due to burning of the waste heap in the year y (tCO<sub>2</sub> equivalent) ,

Baseline emissions due to burning dumps in year y calculated by the formula:

$$BE_{WHB,y} = \frac{FC_{BE,Coal,y}}{1000} \cdot p_{WHB} \cdot NCV_{Coal} \cdot OXID_{Coal} \cdot K_{Coal}^c \cdot 44/12 \quad (12)$$

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 heap because of the project activity in the year y, t;

$p_{WHB}$  - probability of waste heap burning , d/l;

$NCV_{Coal}$  - net Calorific Value of coal, TJ/kt;

$OXID_{Coal}$  - carbon Oxidation factor of coal, d/l;

$K_{Coal}^c$  - carbon content of coal, tC/TJ;

1/1000 - conversion factor from tons in kilotonnes, d / 1

44/12 - stoichiometric relationship between the molecular weight of carbon dioxide and carbon.

The amount of coal produced in mines in the baseline scenario is calculated by the formula:

$$FC_{BE,Coal,y} = FR_{Coal,y} \cdot \left(1 - \frac{A_{Rock,y}}{100} - \frac{W_{Rock,y}}{100}\right) / \left(1 - \frac{A_{Coal}}{100} - \frac{W_{Coal}}{100}\right), \quad (13)$$

where:

$FR_{Coal,y}$  - amount of sorted fraction (0-30mm), which is extracted from the dumps because of the project in a year y, that came to blending with further combustion in thermal power plants, t;

$A_{Rock,y}$  - the average ash content of sorted fractions (0-30mm), which is extracted from dump in year y, %



$W_{Rock,y}$  - the average humidity of sorted fractions (0-30mm), which is extracted from dump in year y, %;

$A_{Coal}$  - the average ash content of coal, mined in Luhansk region of Ukraine, %;

$W_{Coal}$  - the average humidity of coal, mined in Luhansk region of Ukraine, %;

100 - conversion factor from percent to fraction, d/l.

Net Calorific Value of steam coal is calculated by the formula:

$$NCV_{Coal} = \left\{ HCV_{Coal} * \left( 1 - \frac{A_{Coal}}{100} \right) * \left( 1 - \frac{W_{Coal}}{100} \right) - 2.442 * \left[ \frac{W_{Coal}}{100} + k * \left( 1 - \frac{A_{Coal}}{100} \right) * \left( 1 - \frac{W_{Coal}}{100} \right) \right] \right\} * 4.187/1000 \quad (14)$$

where:

$HCV_{Coal}$  - High Calorific Value of coal, kcal/kg

$A_{Coal}$  - The average ash content of coal produced in Luhansk region of Ukraine, in year y, %

$W_{Coal}$  - The average moisture of coal produced in Luhansk region of Ukraine, in year y, %

$k$  - Hydrogen content factor of coal, d/l

100 - Conversion factor from percent to a fraction, d/l

4.187 - conversion factor from calories to kilojoules, kcal/KJ

1/1000 - conversion factor from KJ / kg to TJ/kt

Net Calorific Value, calculated by formula (14), value provided by National Inventory is about 10% lower, so for reasons of conservatism, the project takes the value calculated by the formula (14).

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

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

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**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<sub>2</sub> equivalent):**

This section is left blank on purpose

**D.1.3. Approach to reduce leakage in the monitoring plan:**

The result of this project is the net change (reduction) uncontrolled methane emissions due to of mining activity. As in the baseline scenario the supplying of coal is solely from mine, it leads to uncontrolled methane emissions. These emissions are calculated by applying the default emission factor for the country to the amount of coal extracted from the rock dumps in the project scenario (which is the same amount of coal extracted from mines in the baseline scenario). Carbon dioxide emissions due to electricity consumption in the coal mine way in an amount equivalent to the project amount of coal - a leakage, that can be taken into account at the base of State Statistics Committee<sup>52</sup> data on specific consumption of electricity at coal mines in Ukraine in the relevant year. These leakages are significant and will be included in the monitoring plan and calculating emission reductions for the project.

**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
B1	$FC_{BE,Coal,y}$ - Amount of coal that has been mined in the baseline scenario and combusted for energy use in year y	Company records	t	C	Annually	100%	In paper and electronic form	Calculated using formula (2)
L1	$N_{Coal,y}^E$ - Average electricity consumption per tonne of coal, produced in Ukraine in the year y	See section D.1. Fixed ex ante	MWh/t	E	Fixed ex ante	100%	In electronic form	

<sup>52</sup> <http://www.ukrstat.gov.ua/>





L2	$GWP_{CH_4}$ - Global Warming Potential of Methane	See section D.1. Fixed ex ante	tCO <sub>2</sub> e/ tCH <sub>4</sub>	E	Fixed ex ante	100%	In electronic form	
L3	$EF_{CH_4}$ - Emission factor for fugitive methane emissions from coal mining.	See section D.1. Fixed ex ante	m <sup>3</sup> /t	E	Fixed ex ante	100%	In electronic form	
L4	$\rho_{CH_4}$ - Methane density at standart conditions	See section D.1. Fixed ex ante	t/m <sup>3</sup>	E	Fixed ex ante	100%	In electronic form	
P3	$EF_{CO_2,EL}$ - Specific carbon dioxide emissions due to production of electricity at TPP and by its consumption	See section D.1. Fixed ex ante	tCO <sub>2</sub> e/MWh	E	Fixed ex ante	100%	In electronic form	

### D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO<sub>2</sub> equivalent):

Leakages in year y are calculated as follows:

$$LE_y = LE_{CH_4,y} + LE_{EL,y} \quad (15)$$

де:

$LE_y$  - leakages in year y, (t CO<sub>2</sub>e);

$LE_{CH_4,y}$  - leakages due to fugitive emissions of methane in the mining activities in the year y, (t CO<sub>2</sub>e);

$LE_{EL,y}$  - leakages due to consumption of electricity from a grid at coal mine in a year y, (t CO<sub>2</sub>e);

Leakages due to fugitive emissions of methane in the mining activities in the year y are calculated as follows:

$$LE_{CH_4,y} = - FC_{BE,Coal,y} \cdot EF_{CH_4} \cdot \rho_{CH_4} \cdot GWP_{CH_4} \quad (16)$$

де:

$LE_{CH_4,y}$  - leakages due to fugitive emissions of methane in the mining activities in the year y, (t CO<sub>2</sub>e);

$FC_{BE,Coal,y}$  - 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 because of the project activity in the year y, t, calculated as (2);

$EF_{CH_4}$  - emission factor for fugitive methane emissions from coal mining., m<sup>3</sup>/t;



$\rho_{CH_4}$  - methane density at standart conditions t/m<sup>3</sup>;  
 $GWP_{CH_4}$  - Global Warming Potential of Methane , tCO<sub>2</sub>/ tCH<sub>4</sub>.

Leakages due to consumption of electricity from a grid at coal mine in a year y are calculated as follows:

$$LE_{EL,y} = - FC_{BE,Coal,y} \cdot N_{Coal,y}^E \cdot EF_{CO_2,EL,y} \quad (17)$$

де:  
 $LE_{EL,y}$  - leakages due to consumption of electricity from a grid at coal mine in a year y, (t CO<sub>2</sub>e);  
 $FC_{BE,Coal,y}$  - 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 because of the project activity in the year y, t, calculated as (2);  
 $N_{Coal,y}^E$  - Average electricity consumption per tonne of coal, produced in Ukraine in the year y, MWh/t;  
 $EF_{CO_2,EL}$  - Specific carbon dioxide emissions due to production of electricity at TPP and by its consumption, tCO<sub>2</sub>/ MWh/t;  
 . Leakages due to consumption of other types of energy in coal mines are the minor in comparison to the leakages due to electricity consumption<sup>53</sup>, so in connection with this, and for reasons of conservatism, take them equal to zero.

**D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of CO<sub>2</sub> equivalent):**

The annual emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y, \quad (18)$$

where:

$ER_y$  - emissions reductions of the JI project in year y (tCO<sub>2</sub>e);  
 $BE_y$  - baseline emission in year y (tCO<sub>2</sub>e);  
 $PE_y$  - project emission in year y (tCO<sub>2</sub>e);  
 $LE_y$  - leakages in year y, (tCO<sub>2</sub>e).

<sup>53</sup> The effective method of electricity consumption control at coal mines. B.A.Gryaduschy, Doctor of Technical. Science, DonUGI, G.N.Lisovoy, V.I.Myalkovsky, Chehlaty NA, Cand. Science, NIIGM named M.M.Fedorov, Donetsk, Ukraine [www.mishor.esco.co.ua/2005/Thesis/10.doc](http://www.mishor.esco.co.ua/2005/Thesis/10.doc)



**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:**

Collection and archiving of the information on the environmental impacts of the project will be done based on the approved EIA in accordance with the Host Party legislation - *State Construction Standard DBN A.2.2.-1-2003 : "Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures"*<sup>54</sup> State Committee Of Ukraine On Construction And Architecture, 2004 (see Section F.1).

**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.
B1-B4	Low	These data are used in commercial activities of the company. Calculated on the basis of parameters that were taken from regular sources.
B2	Low	These data are used in commercial activities of the company. The weights will be calibrated according to the procedures of the Host Party. Calibration interval is 1 year.
B3,B5,B6, B8,B9, B12	Low	These data are fixed values and standard constants taken from regular sources
B7	Medium	These data are fixed values and standard constants taken from regular sources
B10, B11	Low	This data are used in the commercial activity of the company. Laboratory data
P1	Low	The electricity meters are calibrated according to the procedures of the Host Party. Calibration interval is 6 years.
P2	Low	This data are used in the commercial activity of the company. Accounting documentation will be used.
P3-P6	Low	These data are fixed values and standard constants taken from regular sources
L1-L3	Low	These data are fixed values and standard constants taken from regular sources

If the expected data are unavailable or lost, the calculations of emissions will be carried out by the most conservative option.

<sup>54</sup> <http://document.ua/proektuvannja.-sklad-i-zmist-materialiv-ocinki-vpliviv-na-na-nor3146.html>



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

“CE ‘GOSPODAR” Ltd is the owner of the project, which will implement the provisions of this monitoring plan with its organizational and management structure. Leadership, headed by the director of the company is responsible for performance of monitoring, data collection, registration, visualization, storage and reporting of data that were monitored, and periodic inspection of measuring instruments. Detailed structure and senior staff members of the Management Group will be submitted in the monitoring before the initial and first periodic verification. The basic structure demonstrated by the following block diagram:

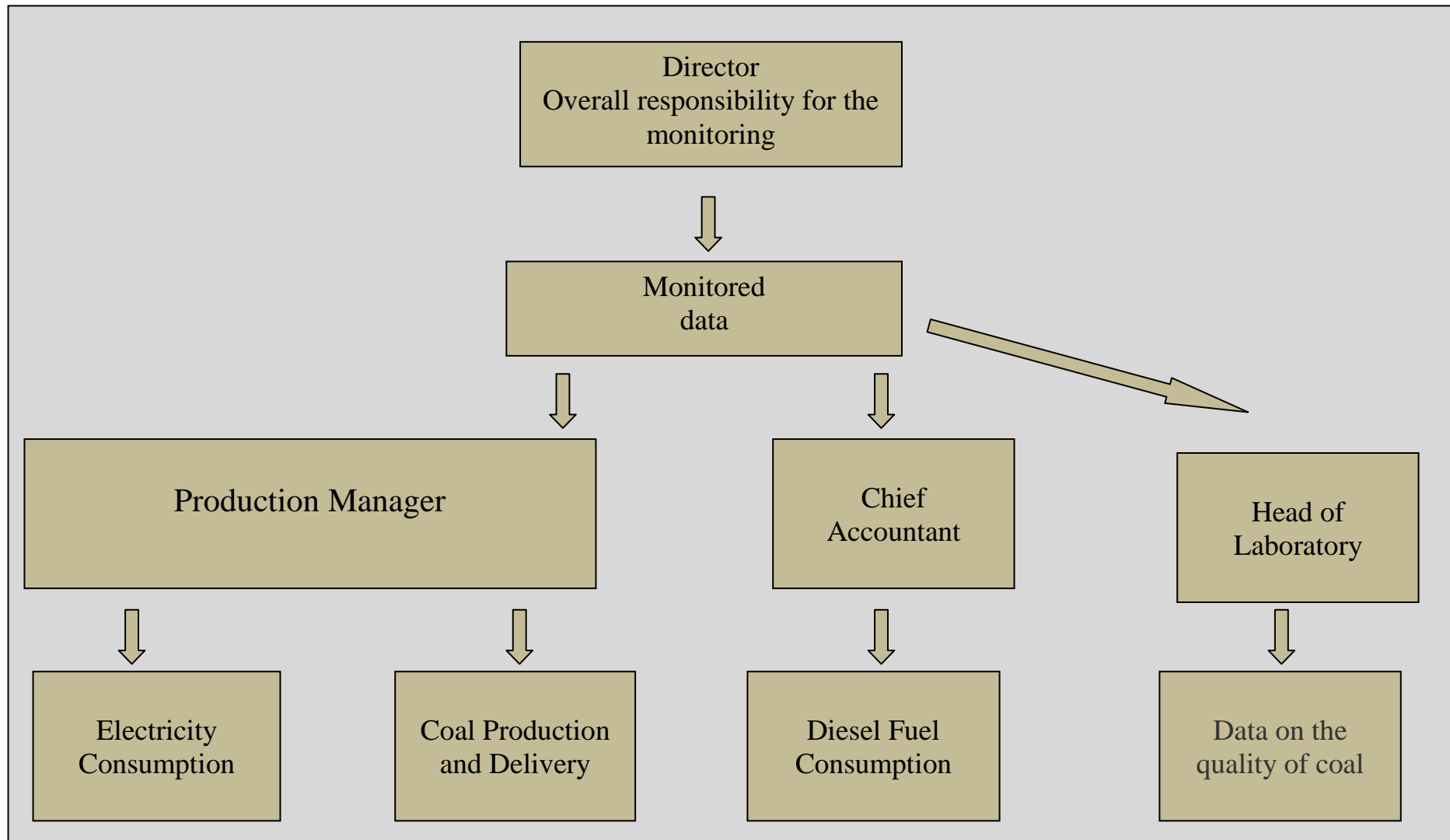


Figure 8 - Monitoring flowchart



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

Gints Klavinsh, Project manager at SIA “Vidzeme Eko”, which is the project participant, tel.+371-29228458, fax371-29228458, e-mail: [siltisilti@gmail.com](mailto:siltisilti@gmail.com) . Please, refer to Annex 1 for contact details.

**SECTION E. Estimation of greenhouse gas emission reductions**

This section contains the assessment of GHG emissions reductions. Calculations carried out using the formulas described in detail in Section D of this document.

**E.1. Estimated project emissions**

Table 25 - Estimated project emissions during the crediting period

		2008	2009	2010	2011	2012	Total	
<b>1</b>	Project Emissions due to consumption of electricity from the grid by the project activity	tCO <sub>2</sub> e	7213	7982	7936	7939	7926	38996
<b>2</b>	Project Emissions due to consumption of diesel fuel by the project activity	tCO <sub>2</sub> e	17297	18933	19090	19048	19046	93414
	Total	tCO <sub>2</sub> e	24510	26915	27026	26987	26972	132410
	Total for 2008-2012	tCO <sub>2</sub> e	<b>132 410</b>					

**E.2. Estimated leakage:**

Table 26 – Estimated leakages during crediting period

		2008	2009	2010	2011	2012	Total	
<b>1</b>	Leakages due to fugitive emissions of methane in mining activity	tCO <sub>2</sub> e	-189920	-217259	-222509	-212769	-212233	-1054690
<b>2</b>	Leakages due to consumption of electricity from grid in mining activity	tCO <sub>2</sub> e	-56279	-67341	-69883	-60862	-60708	-315073
	Total	tCO <sub>2</sub> e	-246199	-284600	-292392	-273631	-272941	-1369763
	Total for 2008-2012	tCO <sub>2</sub> e	<b>-1 369 763</b>					

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

Table 27 - Estimated total project emissions during the crediting period

			2008	2009	2010	2011	2012	Total
<b>1</b>	Total Project emissions during the crediting period	tCO <sub>2</sub> e	-221689	-257685	-265366	-246644	-245969	-1237353

**E.4. Estimated baseline emissions:**

Table 28 - Estimated baseline emissions during the crediting period

			2008	2009	2010	2011	2012	Total
	Baseline Emissions due to burning of the waste heap in the year y	tCO <sub>2</sub> e	737610	781869	804460	769248	767308	3860495
	Total for 2008-2012	tCO <sub>2</sub> e	<b>3 860 495</b>					

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

Table 29 - Estimated emission reductions during the crediting period

			2008	2009	2010	2011	2012	Total
	Emission reductions during the crediting period	tCO <sub>2</sub> e	959299	1039554	1069826	1015892	1013277	5097848
	Total for 2008-2012	tCO <sub>2</sub> e	<b>5 097 848</b>					
	Average annual emission reductions over the crediting period	tCO <sub>2</sub> e	<b>1 054 727</b>					



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

Table 30 - Estimated balance of emissions under the proposed project during the crediting period

Year	Estimated Project Emissions (tonnes CO <sub>2</sub> equivalent)	Estimated Leakage (tonnes CO <sub>2</sub> equivalent)	Estimated Baseline Emissions (tonnes CO <sub>2</sub> equivalent)	Estimated Emissions Reductions (tonnes CO <sub>2</sub> equivalent)
2008	24510	-246199	737610	959299
2009	26915	-284600	781869	1039554
2010	27026	-292392	804460	1069826
2011	26987	-273631	769248	1015892
2012	26972	-272941	767308	1013277
<b>Total (tCO<sub>2</sub> equivalent)</b>	<b>132 410</b>	<b>-1 369 763</b>	<b>3 860 495</b>	<b>5 097 848</b>
Average expected emission reductions over the crediting period (tCO <sub>2</sub> equivalent)			<b>1 054 727</b>	

**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:**

"CE 'GOSPODAR'" Ltd is undertaken under the current legislation of Ukraine, in particular, according to the Laws of Ukraine "On Environmental Protection", "On Ecological Expertise", "On Air Protection", "On Waste" and other applicable rules and regulations<sup>55</sup>.

The Host Party for this project is Ukraine. Environmental Impact Assessment (EIA) is the part of the Ukrainian project planning and permitting procedures. Implementation regulations for EIA are included in the Ukrainian State Construction Standard DBN A.2.2.-1-200347 (Title:"Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures").

Annex F of this standard contains a list of "types of projects or activities which constitute higher environmental risk" for which full EIA is mandatory, and the Ministry of Environment being the competent authority. Project activity, which is the utilization of coal mining waste and production of coal, is included in this list.

The full scope EIA in accordance with the Ukrainian legislation has been conducted for the proposed project in 2007. Key findings of this EIA are summarized below:

- Impact on air is the main environmental impact of the project activity. Dust emissions due to the erosion and project activity such as loading and offloading operations of input rock and processed coal will be limited. Also emissions from transport will be present during the project operation stage. The impact will not exceed maximum allowable concentration at the edge of the sanitary zone;
- Impact on water is minor. The project activity will use water in a closed cycle without discharge of waste water. The possible discharge of the processed water will not have negative impact on the quality of water in the surface reservoirs;
- Impacts on flora and fauna are insignificant. The design documentation demands re-cultivation of the landscape. Grass and trees will be planted on the re-cultivated areas in order to prevent flora and fauna degradation. No rare or endangered species will be impacted. Project activity is not located in the vicinity of national parks or protected areas;
- Noise impact is limited. Main source of noise will be located at the minimum required distance from residential areas, mobile noise sources (automobile transport) will be in compliance with local standards;
- Impacts on land use are positive. Significant portions of land will be freed from the waste heaps and will be available for development. Fertile soil will be used to recultivate the land lot;
- Transboundary impacts are not observed. There are no impacts that manifest within the area of any other country and that are caused by a proposed project activity which wholly physically originates within the area of Ukraine.

**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:**

Assessment of impact on the environment under the laws of Ukraine was held for the proposed project.

According to Ukrainian laws and regulations, preparation of reports on evaluation of environmental impact and the positive conclusions of the State Department of Environment and Natural Resources in Luhansk region is the procedure of environmental impact assessment.

<sup>55</sup> <http://www.budinfo.org.ua/>

**SECTION G. Stakeholder's comments****G.1. Information on stakeholders' comments on the project, as appropriate:**

The project meets the applicable standards and requirements, set forth in Ukraine. The Host Party does not put forward the requirement to consult with stakeholders to JI projects. Stakeholders' comments will be collected during the publication of the project documents on the Internet during the determination process.

Annex 1**CONTACT INFORMATION ON PROJECT PARTICIPANTS**

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Represented by:	Viktor Tkachenko
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Annex 2

**BASELINE INFORMATION**

Table 31 – The key elements of the baseline (including variables, parameters and data sources)

#	Parameter	Data unit	Data sources
1	$FC_{BE,Coal,y}$ - Amount of coal that has been mined in the baseline scenario and combusted for energy use in year y	t	Customer data, calculated using formula (2)
2	$FR_{Coal,y}$ - amount of sorted fraction (0-30mm), which is extracted from the dumps because of the project activity in a year y	t	Customer data (weight scales)
3	$HCV_{Coal}$ - High Calorific Value of steam coal	kcal/kg	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4)
4	$NCV_{Coal}$ - Net Calorific Value of coal	TJ/kt	State Standard 4083-2002. Coal and anthracite for powdered combustion in thermal power plants. Kyiv. State Standard of Ukraine 2002. The standard will be provided by an independent expert organization.
5	$OXID_{Coal}$ - Carbon Oxidation factor of coal	d/l	National Inventory Report of Ukraine 1990- 2010, p.459,465,471
6	$K_{Coal}^C$ - Carbon content of coal.	tC/TJ	National Inventory Report of Ukraine 1990- 2010, p.458, 464, 470
7	$p_{WHB}$ – Probability of waste heap burning	d/l	<i>Report on the analyzing the fire danger of waste heaps in Luhansk region</i> , Scientific Research Institute “Respirator”, Donetsk, 2012.
8	$A_{Coal}$ - The average ash content of coal produced in Luhansk region of Ukraine	%	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4)
9	$W_{Coal}$ - The average moisture of coal produced in Luhansk region of Ukraine	%	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine (see Annex 4)
10	$A_{Rock,y}$ - The average ash content of sorted fractions (0-30mm), which is extracted from dump in year y	%	Customer data (laboratory)
11	$W_{Rock,y}$ - The average humidity of sorted fractions (0-30mm), which is extracted from dump in year y	%	Customer data (laboratory)
12	$k$ - Hydrogen content factor of coal	d/l	State Standard 4083-2002. Coal and anthracite for powdered combustion in thermal power plants. Kyiv. State Standard of Ukraine 2002. The standard will be provided by an independent expert organization.

Annex 3**MONITORING PLAN**

Table 32 - Data on measuring geares of the project:

Parameter	measuring geare	Data unit	Producer	The type	serial number	Accu racy class	The date of instalation	He date of the last calibration
Consumption of electricity	NIK 2303 ART 1	kWh	"NIK-Electronics» Ukraine	Electronic meter of electricity consumption	0023512	±1%	06/10/2007	14/02/2012
The amount of coal	Automobile scales VTA-60	t	SPE "Tehnovagy" Ltd	Automobile Scales-tensometric	169	±25 kg	15/12/2007	14/11/2011

See section D in PDD





Annex 4

AN EXTRACT OF “GUIDE OF QUALITY, VOLUME OF COAL PRODUCTION AND ENRICHMENT PRODUCTS IN 2008-2010”

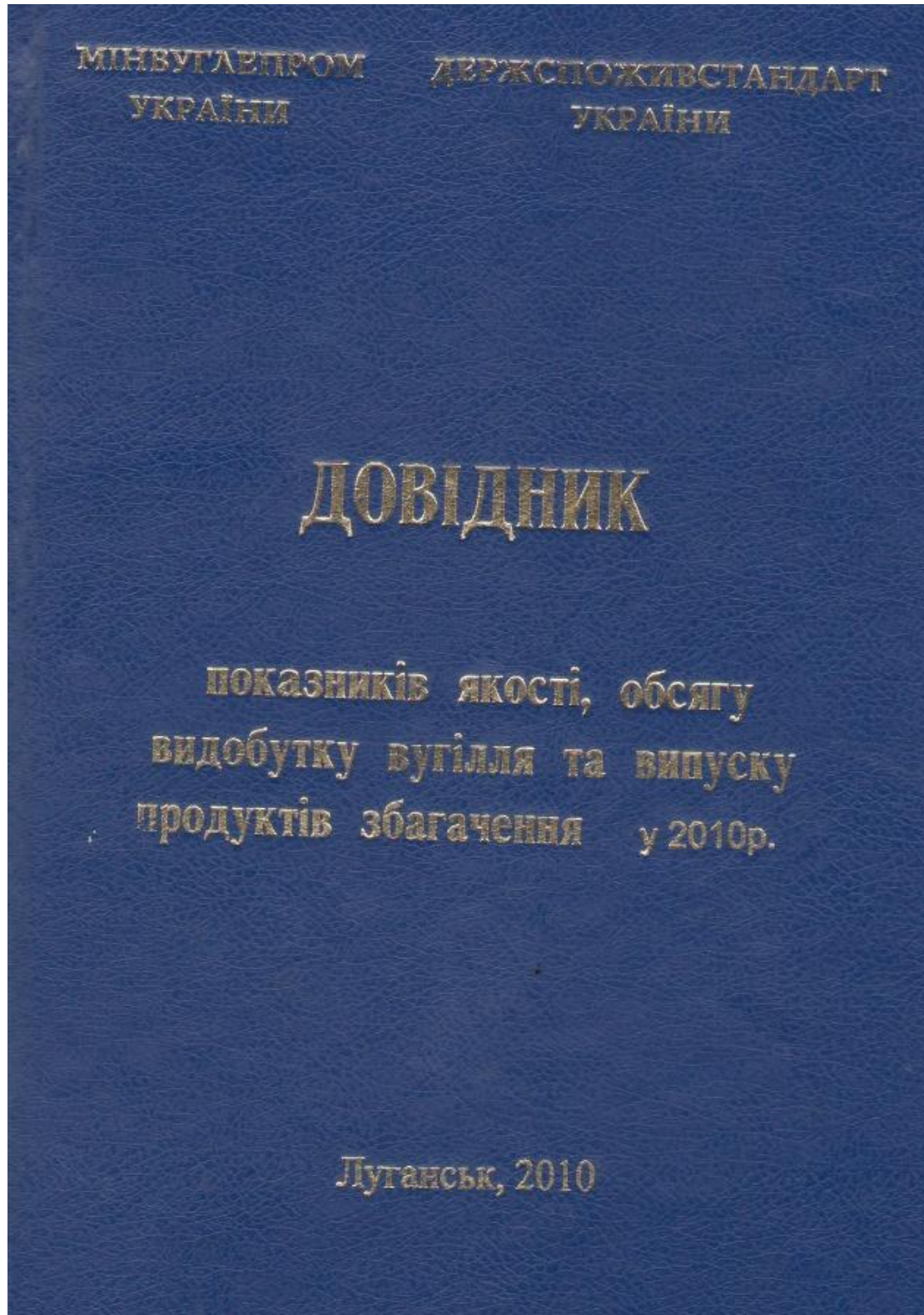




Table 33- Coal mined at mines and sections - 2010.

## I ВИДОБУТОК ВУГІЛЛЯ ШАХТАМИ ТА РОЗРІЗАМИ

Найменування шахти	Дольова участь пластів у видобутку вугілля по шахті у 2010 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток родового вугілля у 2009 році		Видобуток родового вугілля, що планується у 2010 році				Класифікаційні параметри			
		кокс.	енерг.	тис. т	Зольність А <sup>4</sup> , %	тис. т	Зольність А <sup>4</sup> , %	Сірка S <sup>4</sup> , %	Волога W <sup>n</sup> , %	Середній показник відбиття втривиття R <sub>в</sub> , %	Товщина пластичного шару Y, мм	Вихід легкого речовини на сухий стан Y <sup>л</sup> , %	Щільність згорання Q <sub>г</sub> , ккал/кг
<b>МІНВУГЛЕПРОМ УКРАЇНИ</b>				72522,5	38,6	76204,5	38,9	2,0	7,7	-	-	26,5	8166
<i>у тому числі:</i>													
<i>енергетичне вугілля</i>				50458,0	39,2	52135,8	38,9	2,0	8,2	-	-	24,5	8025
		Д		273,2	49,0	200,0	42,1	2,4	13,5	0,57	0	39,5	7487
		ДГ		13663,1	39,9	15455,7	39,4	1,7	11,7	0,58	8	41,5	8089
		Г		12929,9	42,5	12775,1	41,4	2,7	7,6	0,77	12	38,4	7586
		Ж		435,1	35,3	316,0	43,0	3,3	4,0	0,88	23	36,1	8365
		П		7806,1	35,2	8303,0	36,4	2,8	5,5	2,43	0	8,4	8520
		А		15350,6	37,6	15086,0	37,7	1,3	6,6	4,55	0	3,7	8059
				22064,5	37,2	24068,7	39,0	2,1	6,7	-	-	30,9	8470
<i>коксівне вугілля</i>				567,4	32,8	53,3	33,2	1,2	10,2	0,61	9	39,6	8210
		ДГ		2855,0	34,9	4532,7	36,1	2,2	6,9	0,77	14	38,3	8364
		Ж		8388,1	37,5	9807,7	39,0	2,4	6,6	0,96	22	33,0	8383
		К		9430,9	38,1	8694,0	40,8	1,6	6,7	1,23	18	26,1	8605
		ПС		823,1	35,3	981,0	35,7	2,8	6,4	1,61	10	18,2	8650

Найменування шахти	Дольова участь пластів у видобутку вугілля по шахті у 2010 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток родового вугілля у 2009 році		Видобуток родового вугілля, що планується у 2010 році				Класифікаційні параметри			
		кокс.	енерг.	тис. т	Зольність А <sup>4</sup> , %	тис. т	Зольність А <sup>4</sup> , %	Сірка S <sup>4</sup> , %	Волога W <sup>n</sup> , %	Середній показник відбиття втривиття R <sub>в</sub> , %	Товщина пластичного шару Y, мм	Вихід легкого речовини на сухий стан Y <sup>л</sup> , %	Щільність згорання Q <sub>г</sub> , ккал/кг
<b>Підпорядковані Мінвуглепрому</b>				38395,5	39,6	39066,0	39,7	2,1	7,1	-	-	21,0	8193
<i>у тому числі:</i>													
<i>енергетичне вугілля</i>				31265,0	40,0	32171,0	40,0	2,1	7,2	-	-	19,4	8123
		Д		273,2	49,0	200,0	42,1	2,4	13,5	0,6	0	39,5	7487,0
		ДГ		2748,8	43,1	3205,0	41,2	2,6	9,9	0,61	8	40,6	7915
		Г		9645,4	43,6	10332,0	43,5	2,8	7,4	0,78	12	38,1	8174
		Ж		435,1	35,3	316,0	43,0	3,3	4,0	0,90	23	36,1	8365
		П		2811,9	36,8	3032,0	37,9	2,7	6,6	2,30	0	8,6	8503
		А		15350,6	37,6	15086,0	37,7	1,3	6,6	4,55	0	3,7	8059
<i>коксівне вугілля</i>				7130,5	37,8	6895,0	38,5	2,5	6,7	-	-	28,2	8523
		Г		1452,5	35,5	1360,0	37,0	1,8	6,6	0,80	14	36,6	8385
		Ж		2358,0	35,4	2150,0	37,2	2,6	6,8	1,02	21	32,4	8437
		К		2496,9	42,1	2404,0	41,7	2,7	6,7	1,33	21	23,6	8625
		ПС		823,1	35,3	981,0	35,7	2,8	6,4	1,61	10	18,2	8650
<b>Непідпорядковані Мінвуглепрому</b>				34127,0	37,4	37138,5	38,1	1,9	8,3	-	-	32,4	8136
<i>у тому числі:</i>													
<i>енергетичне вугілля</i>				19193,0	37,9	19964,8	37,2	1,9	9,8	-	-	32,7	7867
		ДГ		10914,3	39,0	12250,7	38,9	1,4	12,2	0,6	8	41,8	8135
		Г		3284,5	39,3	2443,1	32,5	2,6	8,3	0,7	11	39,6	5096
		П		4994,2	34,4	5271,0	35,5	2,8	4,9	2,5	0	8,3	8530
				14934,0	36,9	17173,7	39,1	2,0	6,7	-	-	32,0	8449
<i>коксівне вугілля</i>				567,4	32,8	53,3	33,2	1,2	10,2	0,6	9	39,6	8210
		ДГ		1402,5	34,3	3172,7	35,6	2,4	7,1	0,7	13	39,0	8355
		Г		6030,1	38,3	7657,7	39,5	2,3	6,5	0,9	22	33,1	8368
		Ж		6934,0	36,6	6290,0	40,5	1,3	6,7	1,2	18	27,0	8597
		К		34127,0	37,4	37138,5	38,1	1,9	8,3	-	-	32,4	8136



Найменування шахти	Дольова участь в видобутку вугілля по шахті у 2010 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток рідкого вугілля у 2009 році		Видобуток рідкого вугілля, що планується у 2010 році				Класифікаційні параметри			
		кокс.	енерг.	тис. т	Зольність А <sup>д</sup> , %	тис. т	Зольність А <sup>д</sup> , %	Сірка S <sup>д</sup> , %	Волога W <sup>д</sup> , %	Середній показник відбиття втринити R <sub>с</sub> , %	Товщина пластинчатого шару Y, мм	Вихід легких речовин на сухий стан V <sup>л</sup> , %	Вища теплота згорання Q <sub>с</sub> <sup>н</sup> , ккал/кг
<b>Донецька область</b>				32159,6	38,1	32038,5	38,3	2,2	6,9	-	-	25,6	8389
у тому числі													
Підпорядковані Мінеулепрому				17919,6	40,0	18344,0	39,9	2,4	7,1	-	-	27,6	8307
Непідпорядковані Мінеулепрому				14240,0	35,6	13694,5	36,2	2,0	6,6	-	-	22,9	8499
у тому числі:													
енергетичне вугілля				16921,1	39,5	18025,0	38,7	2,4	6,6	-	-	22,3	8294
		Д		273,2	49,0	200,0	42,1	2,4	13,5	0,57	0	39,5	7487
		ДГ		1460,3	44,7	1575,0	41,8	2,6	8,7	0,63	8	41,2	8017
		Г		6431,7	42,1	6906,0	40,1	2,5	7,3	0,80	12	37,8	8194
		П		7074,8	35,1	7458,0	36,3	2,7	5,4	2,44	0	8,4	8519
		А		1681,1	42,3	1886,0	40,2	1,0	6,6	4,17	0	3,5	8091
коксівне вугілля				15238,5	36,4	14013,5	37,9	2,0	7,2	-	-	29,7	8511
		Г		2037,5	35,1	1985,8	36,6	2,5	6,8	0,79	17	35,3	8408
		Ж		4497,7	34,6	4757,7	36,2	2,4	7,4	0,99	21	33,6	8476
		К		7944,3	37,9	6394,0	39,7	1,4	7,2	1,20	17	26,7	8551
		ПС		759,0	35,9	876,0	36,5	2,7	6,3	1,58	10	18,4	8643
<b>Луганська область</b>				23401,7	38,8	25802,0	39,3	2,1	6,9	-	-	17,6	7873
у тому числі													
Підпорядковані Мінеулепрому України				17246,7	38,3	17502,0	38,4	1,9	7,3	-	-	11,1	8062
Непідпорядковані Мінеулепрому України				6155,0	40,4	8300,0	41,1	2,5	6,0	-	-	31,3	7473

Найменування шахти	Дольова участь в видобутку вугілля по шахті у 2010 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток рідкого вугілля у 2009 році		Видобуток рідкого вугілля, що планується у 2010 році				Класифікаційні параметри			
		кокс.	енерг.	тис. т	Зольність А <sup>д</sup> , %	тис. т	Зольність А <sup>д</sup> , %	Сірка S <sup>д</sup> , %	Волога W <sup>д</sup> , %	Середній показник відбиття втринити R <sub>с</sub> , %	Товщина пластинчатого шару Y, мм	Вихід легких речовин на сухий стан V <sup>л</sup> , %	Вища теплота згорання Q <sub>с</sub> <sup>н</sup> , ккал/кг
у тому числі:													
енергетичне вугілля				17960,6	38,4	18347,0	38,1	1,9	7,4	-	-	12,7	7641
		ДГ		812,5	43,1	1040,0	42,5	3,0	12,0	0,56	8	41,8	7792
		Г		2747,3	44,1	3262,0	40,1	3,7	9,2	0,66	11	40,7	8690
		П		731,3	36,7	845,0	36,7	3,3	6,7	2,36	0	9,0	8531
		А		13669,5	37,1	13200,0	37,3	1,4	6,6	4,61	0	3,7	8055
коксівне вугілля				5441,1	40,2	7455,0	42,2	2,4	5,6	-	-	29,7	8443
		Ж		3890,4	40,8	5050,0	41,7	2,3	5,8	0,93	22	32,4	8295
		К		1486,6	39,2	2300,0	43,9	2,4	5,2	1,29	22	24,4	8755
		ПС		64,1	29,2	105,0	29,3	3,6	7,6	1,81	8	17,0	8705
<b>Дніпропетровська область</b>				13732,0	38,0	15144,0	38,2	1,6	11,2	-	-	41,5	8172
у тому числі													
енергетичне вугілля				12347,1	38,5	12543,8	38,8	1,5	12,1	-	-	41,7	8140
		ДГ		10914,3	39,0	12250,7	38,9	1,4	12,2	0,57	8	41,8	8135
		Г		1432,8	34,4	293,1	33,0	2,1	7,9	0,75	10	40,1	8334
коксівне вугілля				1384,9	33,8	2600,2	35,5	2,0	7,0	-	-	40,6	8326
		Г		567,4	32,8	53,3	33,2	1,2	10,2	0,61	9	39,6	8210
		ДГ		817,5	34,5	2546,9	35,6	2,0	7,0	0,75	11	40,6	8329
<b>Волинська область</b>													
енергетичне вугілля			ДГ	476,0	38,2	590,0	37,2	2,1	9,3	0,64	7	37,1	7857
<b>Львівська область</b>													
енергетичне вугілля				2753,2	45,0	2630,0	47,6	2,3	5,8	-	-	36,7	8348
		Г		2318,1	46,8	2314,0	48,3	2,2	6,1	0,9	14	36,8	8345
		Ж		435,1	35,3	316,0	43,0	3,3	4,0	0,9	21	36,1	8365



Table 34- Coal mined at mines and sections - 2008

## I ВИДОБУТОК ВУГІЛЛЯ ШАХТАМИ ТА РОЗРІЗАМИ

Найменування шахти	Дольова участь виластів у видобутку вугілля по шахті у 2007 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток родового вугілля у 2007 році		Видобуток родового вугілля, що планується у 2008 році				Класифікаційні параметри			
		кокс.	енерг.	тис. т	Зольність А <sup>4</sup> , %	тис. т	Зольність А <sup>4</sup> , %	Сірка S <sup>1</sup> , %	Волога W <sup>1</sup> , %	Середній показник вмісту вугілля R <sub>h</sub> , %	Товщина пластинного шару У, мм	Вихід летючих речовин на сухий стан V <sup>40</sup> , %	Висота теплоти згорання Q <sub>d</sub> <sup>40</sup> , ккал/кг
<b>МІНВУГЛЕПРОМ УКРАЇНИ</b>				75095,4	38,1	78343,6	38,4	2,1	8,0	-	-	28,1	8243
<i>у тому числі:</i>													
<i>Підпорядковані Мінвуглепрому</i>				42152,3	40,1	46000,0	39,2	2,2	7,1	-	-	24,0	8195
<i>Непідпорядковані Мінвуглепрому</i>				32943,1	35,5	32343,6	37,2	2,1	9,4	-	-	33,9	8311
<i>у тому числі:</i>													
<i>енергетичне вугілля</i>				49145,3	39,0	53103,0	38,6	2,1	8,6	-	-	25,8	8153
			Д	270,2	48,9	365,0	40,5	2,4	13,0	0,50	0	41,2	7700
			ДГ	8241,5	41,6	8465,0	40,1	1,9	11,2	0,61	8	42,6	8011
			Г	16608,8	41,8	18780,0	41,8	2,6	8,4	0,76	10	40,7	8176
			Ж	290,5	28,6	165,0	33,5	2,9	5,4	0,87	23	36,0	8377
			П	7012,4	34,5	7183,0	34,4	2,7	5,6	2,40	0	10,1	8543
			А	16502,5	37,0	17290,0	36,8	1,3	6,5	4,10	0	5,6	8088
			Б	219,4	24,9	855,0	24,5	3,8	55,6	0,35	0	60,6	6999
<i>коксівне вугілля</i>				25950,1	36,3	25240,6	37,9	2,2	6,7	-	-	33,0	8449
			Г	3228,4	35,4	3600,0	36,3	1,6	7,5	0,72	12	40,9	8386
			Ж	11879,0	35,5	12657,6	37,3	2,8	6,5	0,93	25	35,0	8480
			К	10141,9	37,5	8103,0	39,6	1,5	6,8	1,24	19	27,8	8400
			ПС	701,8	38,6	890,0	36,3	3,0	6,8	1,65	10	20,0	8613

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Найменування шахти	Дольова участь виластів у видобутку вугілля по шахті у 2007 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток родового вугілля у 2007 році		Видобуток родового вугілля, що планується у 2008 році				Класифікаційні параметри			
		кокс.	енерг.	тис. т	Зольність А <sup>4</sup> , %	тис. т	Зольність А <sup>4</sup> , %	Сірка S <sup>1</sup> , %	Волога W <sup>1</sup> , %	Середній показник вмісту вугілля R <sub>h</sub> , %	Товщина пластинного шару У, мм	Вихід летючих речовин на сухий стан V <sup>40</sup> , %	Висота теплоти згорання Q <sub>d</sub> <sup>40</sup> , ккал/кг
<b>Донецька область</b>				33790,3	38,6	34598,6	38,2	2,3	7,0	-	-	28,5	8341
<i>у тому числі:</i>													
<i>Підпорядковані Мінвуглепрому</i>				19249,1	42,1	22270,0	39,8	2,4	7,1	-	-	31,1	8292
<i>Непідпорядковані Мінвуглепрому</i>				14541,2	34,1	12328,6	35,3	2,1	6,8	-	-	24,0	8430
<i>у тому числі:</i>													
<i>енергетичне вугілля</i>				16282,4	40,4	19033,0	38,8	2,4	6,9	-	-	26,1	8280
			Д	270,2	48,9	365,0	40,5	2,4	13,0	0,50	0	41,2	7700
			ДГ	2089,3	48,5	2265,0	41,9	2,2	8,9	0,69	8	41,6	7950
			Г	5759,2	41,7	7760,0	40,7	2,7	7,4	0,85	13	39,9	8221
			П	6302,3	35,1	6403,0	34,7	2,6	5,6	2,42	0	10,0	8540
			А	1863,4	43,9	2240,0	40,6	1,0	6,3	3,73	0	6,5	8172
<i>коксівне вугілля</i>				17507,9	37,0	15565,6	37,5	2,1	7,1	-	-	31,5	8416
			Г	657,0	37,2	870,0	35,0	1,2	6,0	0,92	12	39,0	8365
			Ж	7133,9	36,6	6867,6	36,0	2,8	7,3	0,99	25	35,3	8457
			К	9064,9	37,1	7003,0	39,3	1,5	7,0	1,24	17	28,2	8360
			ПС	652,1	39,0	825,0	36,4	3,0	6,7	1,66	10	20,2	8607
<b>Луганська область</b>				25208,7	36,7	27075,0	37,7	2,1	6,8	-	-	18,6	8192
<i>у тому числі:</i>													
<i>Підпорядковані Мінвуглепрому України</i>				19387,6	37,1	20185,0	37,2	1,9	7,2	-	-	13,7	8075
<i>Непідпорядковані Мінвуглепрому України</i>				5821,1	35,0	6890,0	39,3	2,6	5,5	-	-	33,1	8531

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Annex 5:

Reference of the State Statistics Service of Ukraine "The actual costs of electricity production per one tonne of coal stone agglomerated"



**ДЕРЖАВНА СЛУЖБА СТАТИСТИКИ УКРАЇНИ**  
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29.05.2012р. № 15/1-20/692/11 На № \_\_\_\_\_ від \_\_\_\_\_

Товариство з обмеженою відповідальністю  
«Науково-дослідний центр КТФ»

01030 м. Київ, вул. Б. Хмельницького, 16/22

На Ваш лист від 23.05.2012р. № 12 Держстат у межах своїх повноважень надає наявну статистичну інформацію щодо фактичних витрат електроенергії на видобуток однієї тонни вугілля кам'яного неагломерованого.

Фактичні витрати електроенергії на видобуток однієї тонни вугілля кам'яного неагломерованого\*.

	кВт.г/т			
	2008	2009	2010	2011
Україна	87,8	90,5	92,6	84,2

\* Розраховано як частка від ділення фактичних витрат електроенергії на видобуток вугілля кам'яного неагломерованого за звітний період на обсяг видобутого вугілля кам'яного неагломерованого за звітний період, помножена на 1000.

Заступник Голови



Н.С. Власенко

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