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

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Annexes

SECTION A. General description of the project

A.1. Title of the project:

Rock Mass Processing of the Waste Heap with the Aim of Decreasing the Greenhouse Gases Emissions into the Atmosphere

The sectoral scope: (8) Mining/mineral production

The version number of the document: 2.1

The date of the document: 26th of September 2012

A.2. Description of the project:

General provisions on the problem of waste heaps formation

Activity of coal mines in such conditions result in vast amounts of matter being extracted and brought to the surface. Coal is separated from rock and this non-coal matter forms huge waste heaps of tailings found almost everywhere in Donbas. Separation process on the mines was not and sometimes is not entirely efficient. For a long period of time it was not economically feasible to extract 100% of coal from the rock that had been mined. That is why Donbas waste heaps contain considerable masses of coal. In the course of time those waste heaps are vulnerable to spontaneous ignition and slow combustion. According to different estimates the rock that is mined contains only up to 65-70% of coal only, the rest is barren rock. Up to 60% of this rock is put into waste heaps. According to specialists' research, percentage of combustible material in waste heaps is 15-30%; meanwhile there can be from 7% to 28-32% of coal[1]. Waste heaps that are burning or are close to spontaneous ignition are sources of uncontrolled greenhouse gas and hazardous substances emissions. The latter include sulphurous anhydride that transforms into sulphur acid and is the reason for acid rains, hydrogen sulphide and carbon oxide.

Project purpose

This project involves the introduction of dry beneficiation method of rock mass of the waste heap to reduce greenhouse gas emissions resulting from spontaneous combustion of its flammable components. Prevention of spontaneous combustion of the waste heap will reduce the negative impact on the environment.

Situation prior to proposed project

By-product of continuous operation of coal mining enterprises is the formation of tapered heaps from rocks containing coal – waste heaps. Smouldering and burning waste heaps are fundamental factor in violation of environmental and economic balance of Donbas mining areas, causing the formation of complicated environmental situation, which negatively affects the state of the atmosphere, soil, water bodies, leads to degradation of natural landscapes and is detrimental to health and life of people.

The process of beneficiation at the mines was not very effective, extracting 100% of coal from rock that was raised to the surface was not considered economically feasible. Consequently, waste heaps of Donbas, especially formed in 60-70 years, contain large amount of coal. Dumping mass of the studied mine waste heaps has ash content within the limits of 57-99%, accounting for 88.5% in average. Water content varies from 0.2% to 11.7%, accounting for 3.4% in average[2]. However, the content of coal even within one waste

[1] *Geology of Coal Fires: Case Studies from Around the World*, Glenn B. Stracher, Geological Society of America, 2007, p. 47

[2] http://www.ipages.ru/index.php?ref_item_id=2607&ref_dl=1

heap undergoes significant fluctuations and is poorly predicted. There is a possibility that significant part of the waste heap may contain small amount of coal, while the other part has higher concentration of coal mass and increased susceptibility to spontaneous combustion. Over time, almost all waste heaps containing coal are very susceptible to spontaneous combustion and stationary long burning. Those heaps that are currently burning or are at risk of ignition are sources of fugitive emissions of greenhouse gases and hazardous substances. Oxidation and combustion of rocks is accompanied by emissions of a wide range of volatile components that escape from the rock mass beneficiated by coal substance. Hot waste heaps produce steam, which except water also may contain: sulphuric acid (sulphate ion), carbon dioxide, nitrogen dioxide (nitrate ion). With a lack of oxygen, combined-cycle emissions contain hydrogen sulphide, hydrocarbons, ammonia, and carbon monoxide. Water erosion of waste heap leads to leaching of toxic components and contamination of soil and groundwater by them, spreading with them over long distances. Thus, the role of the waste heaps in the ecology of the region is extremely negative, increasing many times during its burning. However, outbreak and its very possibility are difficult to forecast, we can only estimate the probability of ignition, which is very high on the basis of statistics. You can say that most waste heaps, sooner or later, undergo self-ignition. The process of burning carbon in the waste heap is long enough and lasts for 5-7 years[3].

Situation in the baseline scenario:

Baseline scenario assumes that the problem of waste heaps combustion will not be effectively resolved, rock mass of waste heaps will undergo self-ignition until all volume of coal contained in it does not burn. Continuation of existing situation will lead to large emissions of greenhouse gases in the atmosphere and to the general pollution of the ecosystem of the region.

Project scenario:

Project “Rock Mass Processing of the Waste Heap with the Aim of Decreasing the Greenhouse Gases Emissions into the Atmosphere” provides implementation of a number of technical solutions on dismantling and further processing of rock mass of the waste heap, located in the urban type settlement Kalininskiy, Sverdlovsk district, Lugansk region, Ukraine. This heap was shaped by the former mine CCM “Mayak” and was closed in 1967.

For dismantling of the waste heap, special equipment and vehicles will be involved. After transportation of rock to the sorting installation, its processing will be done (department of combustible components from the barren rock) in order to obtain coal with high quality characteristics. Thermal coal will be produced under the project for the purposes of heat and power engineering and households. Technical specifications of the complex for waste heap processing will allow extracting additional amount of coal that will replace the coal extracted in coal mines, production of which would lead to fugitive methane emissions.

Brief information on the history of the project and the role of JI:

Decision on implementation of the project, which provides recultivation of the waste heap of the former mine of CCM “Mayak” with the aim of reducing GHG emissions, was made in early 2007. During 2007 agreement with contractors, who will provide transportation services, was signed, and lease agreement was concluded for complex of rock mass processing. Starting date of the project is February 2, 2008, when operation of beneficiation installation began.

[3] http://ji.unfccc.int/UserManagement/FileStorage/IE7LK2SZF1NOXRVB4CYG65WQPJMHA3

A.3. Project participants:

Table 1 – Project participants

Party involved	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (Host party)	"REMSTROYPROEKT 2002" LLC	No
Estonia	ProEffect OÜ	No

"REMSTROYPROEKT 2002" LLC is Host party of the project and project participant. "REMSTROYPROEKT 2002" LLC is the owner of the emission source, where realization of the joint implementation project is planned.

"REMSTROYPROEKT 2002" LLC company is the initiator of the project and developer of project design document at the same time. This company specializes in waste heaps dismantling and implements JI project under the Kyoto Protocol.

ProEffect OÜ is a project participant and potential buyer of ERUs under the project. Detailed contact information is provided 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 is given below in subsections from A.4.1. to A.4.3.

A.4.1. Location of the project:

Urban type settlement Kalininskiy, Sverdlovsk district, Lugansk region, Ukraine.

A.4.1.1. Host Party (ies):

Ukraine.

Ukraine is the Eastern European country that ratified the Kyoto Protocol to the Framework UN Convention on February 4, 2004, is included in the list of countries of Annex 1, and meets the requirements for participation in Joint Implementation projects.

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

Lugansk region.

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

Urban type settlement Kalininskiy.

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

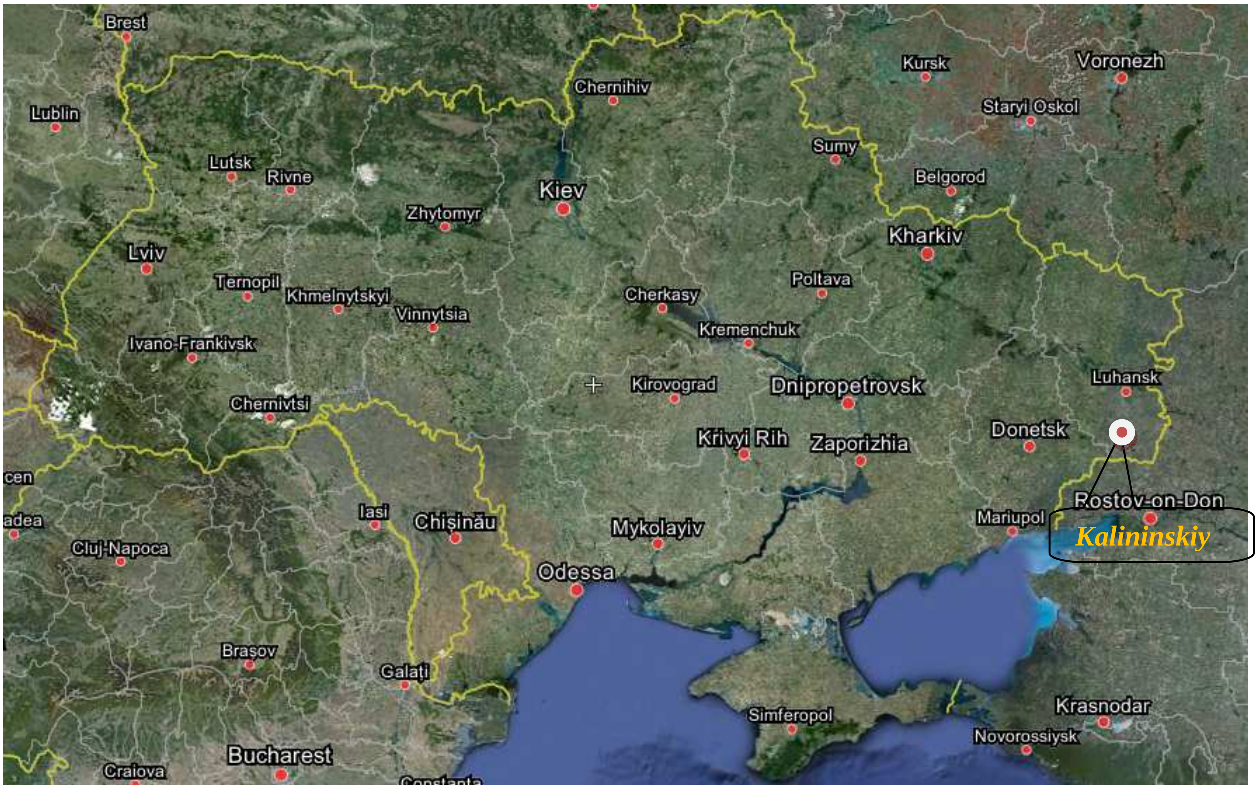

Figure 1 – Map of Ukraine and location of the project area

The nearest settlement – Kalininskiy – urban-type settlement in Lugansk region, administratively subordinated to the municipal authorities of Sverdlovsk town, Lugansk region, Ukraine. It was called Kalinina before. It was founded in 1922, the actual population is 1 735 people as of 01/01/2011. The nearest railway station is Dovzhanska. Kalininskiy settlement is located in the Donetsk coal basin, centre of coal extraction (anthracite) — economic coal mining complex “Sverdlovantratsit”, and also SPJSC CCM “Mayak”, State Enterprise “Shakhtoupravlinnya “Luganske”, group beneficiation factory “Sverdlovska”. Kalininskiy urban-type settlement is located in the eastern part of Ukraine at the distance of 78km from the regional centre of Lugansk city and 850km from the capital of Ukraine, Kyiv:

+48° 1' 24.10", +39° 36' 35.78"

Satellite photo of location is shown below in Figure 2.

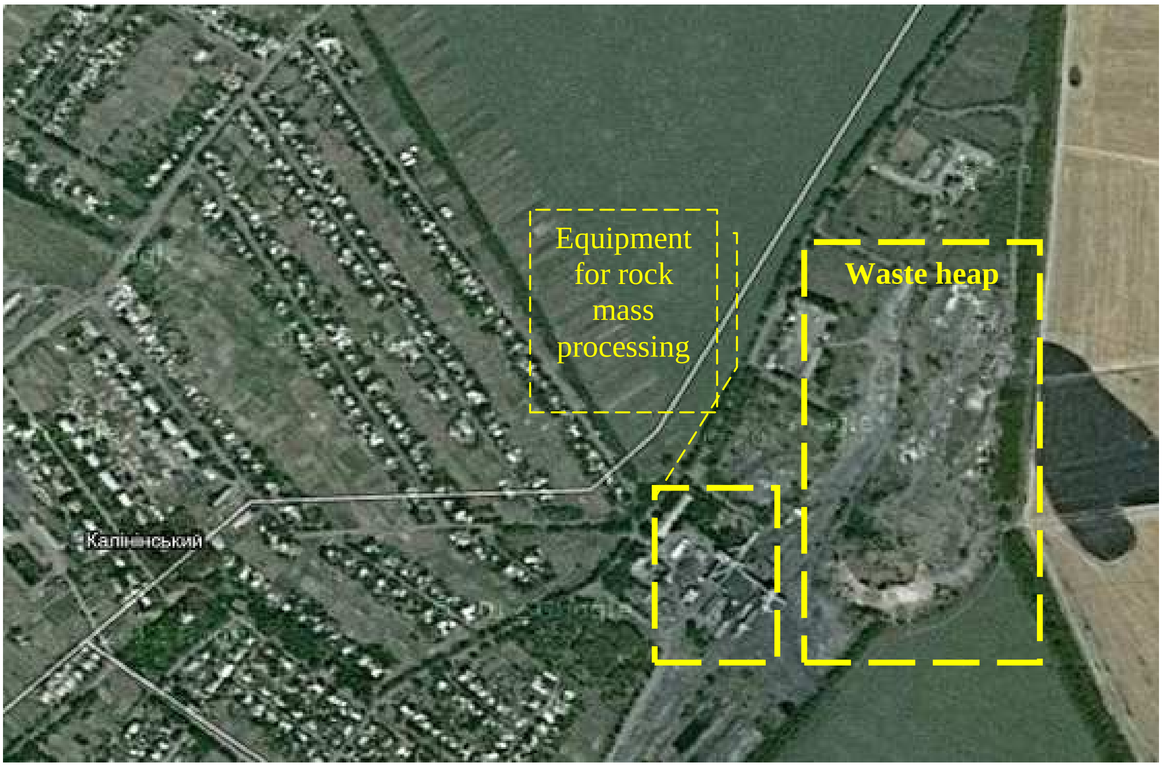

Figure 2 – Location map of the project

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

Recently, there is a tendency of growing popularity of dry methods of separation and beneficiation of different bulk materials. Application of the method vibration-pneumatic separation allows creating compact and mobile beneficiation installations with a constant cycle of work. These installations have opportunity of operative management and regulation of the main technological parameters of the beneficiation process. Great advantage is independence of beneficiation system from the water resources and communicational facilities of warehousing highly moist products; this is important positive factor of installations location in the sites with limited access to hydro resources. Application of this beneficiation method is very important for this area, because the territory of Donbas has limited water resources because of geographical location. In addition, keeping of water management in the production requires a large territory and significant funds for its service. Dry method of coal beneficiation excludes the possibility of pollution of hydro system of environment, because it does not require the use of water.

Waste heap processing complex is located in the urban type settlement Kalininskiy, Lugansk region. According to the agreement No. 10/07-123 dated January 25, 2008 "REMSTROYPROEKT 2002" LLC received from the CUSTOMER a waste heap, deployed on the territory of Kalininska Village Council, Lugansk region, with total area of 2.2 hectares in the amount of 2,192,000 tons, for performance of works on mining engineering recultivation of the waste heap in order to implement JI project on reducing greenhouse gas emissions, what is provided by Article 6 of the Kyoto Protocol to UN Framework Convention on Climate Change dated 09/05/92. The proposed project involves the extracting coal of A, G sorts for the needs of energy sector of the industry, in particular as charge for TPP.

Technological scheme of coal extraction from the rock is represented by the following elements:

- Scraper conveyor;
- Bunker for receiving rock mass;
- Installation of classification of raw materials (screen);
- Pneumatic separator SVP-5,5 × 1;
- Smoke exhauster DBN-18;
- Ventilator VDNu-12,5;
- Cyclone CN-25;
- Bunker for receiving final product;
- Point of coal shipment;
- Conveyors #1,2,3.

Packaging of facilities of point for processing rock mass in technological complex provides available thoroughfare to the industrial site and entrances of mobile hoisting equipment for repair works.

Raw material base for beneficiation complex is rock mass, transported from the waste heap. These raw materials are processed to obtain thermal coal of A and G sort with the size of 0-75mm. Operation mode of the complex may vary depending on the quality of the feedstock. For obtaining high-quality coal products, point of processing waste heap can work in reverse mode. Remote coal after the first sorting is again loaded to the pneumatic separator with the aim of reducing the percentage of ash component of rocks. View of the waste heap, rock mass of which is processed, is presented in the figure below:

Figure 3 – View of the waste heap, rock mass of which is processed under the project

Figure 4 – Technology that dismantles a waste heap

General view of the beneficiation plant is shown at the Figure 5.

Figure 5 – General view of the complex for processing rock mass of the waste heap

Element of technological complex, which allows separating coal from barren rock, pneumatic separator SVP-5, 5×1. Pneumatic separator SVP-5.5 × 1 is developed by “Lugansk Machine-Building Plant named after A.

Parkhomenko" LLC and is intended for beneficiation of coal, ores and other bulk materials with bulk density up to 2.8 t/m^3, surface moisture up to 8% and material size up to 75mm. Depending on the characteristics of coal and rock mass, separator structure allows to implement different schemes of division into two or three products: concentrate, middlings and wastes of beneficiation.

Technical characteristic of pneumatic separator SVP-5.5×1 is given below:

Table 2 – Technical characteristics of pneumatic separator SVP-5.5×1

Technical characteristics	Indicators
Working area of separation, m^2	6.7
Nominal width of the deck, m	1.42
Productivity on the original material (including circulating load), t/h	100
Size of beneficiation material, mm	up to 75
Uncertainty of separation (at maximum efficiency), not more	0.25
Range of controlled and regulated frequency of deck oscillation, Hz (min^{-1})	5.0-6.67 (300-400)
Dimensions, mm, not more: - length - width - height	 6450 3906 7750
Specific electricity consumption, kW/t	3.5
Weight, kg, not more	12570
Power consumption of control system, kW, not more	0.5
Dynamic loads, transferred to building structures through separator resistance, kN, not more: - vertical - horizontal	 8 6

In separator construction pulsating supply of process air under perforated deck is used. Principle of operation and separator construction allows receiving quality of beneficiation products (with separation of two or three products) in accordance with the requirements of the consumer. Distribution of ash in the flow of is growing differentially around the perimeter of the loading part of deck and repeats the law of distribution and output of factions of incoming raw materials.

Separation of source material to light (concentrate) and heavy (rock) fractions occurs due to implementation of their counter current movement on the inclined work surface.

Coal beneficiation takes place on the sloping decks of the perforated work surface that bobs, through the holes of which air is blown. The air under deck goes with the help of technological ventilator through air duct is divided into pipes and diffusers in the upper part. The number of pipes and diffusers corresponds to the number of air zone of separator. Dusty air is removed through the chimney hood.

Deck construction provides possibility to change its angle of inclination in the transverse and longitudinal directions. On the deck of separator there are guides (riffles), made from steel strips of different heights. Riffles have the biggest height in the zone of concentrate unloading. The height of the guides gradually decreases as in longitudinal and in the transverse directions; in the zone of shipment of waste it is minimal.

Through the device that loads the material, coal and rock mass goes on the deck of separator, where with the help of the feeder it is distributed, forming bed.

Deck is installed on inclined supports, making rotation and translational motion (swing), due to that bed moves by inertia upward in the direction, perpendicular to the plane of resistance. As a result of such vibrations and simultaneous influence of air flow, bed material fluffs and gets "fluidity".

Due to inclination of the deck in the transverse direction and translational movement of bed, layer of light particles, which is located higher than the guides, gradually "slides down" down at an angle to the axis of the separator and unloads along its rim in the front part of the deck. The lower layers of bed that are between the guides are moving along them. Products are uploaded on the perimeter separator.

Beneficiation complex of rock mass, based on vibration pneumatic separator SVP-5.5×1, is part of modular facilities for processing materials from coal.

According to the project, implementation of the full cycle for beneficiation of rock mass from extraction of coal from the waste heaps to loading as an end-product in automobile transport is prescribed. Removing coal from the waste heap is the first stage of the project activity, which involves the introduction of the second stage, namely, recultivation of rock mass and formation of a new heap. Recultivated land will be planted with vegetation and transferred for agricultural use.

The maximum production capacity of facility for processing rock mass is 504 tons of raw materials. General productivity indicators of the project equipment depend on the work mode and technical parameters of the complex. According to the passport of the waste heap of the former mine CCM "Mayak" ash content of the rock mass is 68.4%, and in accordance with the balance of beneficiation products under the project, expected coal content in the rock is approximately 27%.

Stages of technological process are following:

1. Reception of rock mass from transport;
2. Transfer of rock mass by scraper conveyor to the collection point;
3. Control classification of rock mass at screen according to fraction of 0-75mm;
4. Loading fraction of 0-75 mm to transport by belt conveyor;
5. Transfer of rock mass of >75mm class by transport to collection point;
6. Accumulation of raw material in bunker with capacity of 20 tons;
7. Transportation of coal of 0-75 mm class by belt conveyor to pneumatic separator;
8. Transfer of the final product (coal) to the special bunker with capacity of 15 tons and further loading into transport;
9. Transportation of beneficiation wastes by belt conveyor to the loading into transport.
10. Shipment of wastes (fraction> 75 mm) to transport and their subsequent storage.

The scheme of processing of rock mass 0-75mm is the following: rock substance is transported from the waste heap to the classification point. With the help of the special feeder and belt conveyor, rock mass is supplied to the classification point (screen), where the separation of rock mass into classes 0-75mm and >75mm is done.

After classification, material 0-75mm is sent to the trestle #2, where by means of the belt conveyor it is transported to the bunker with capacity of 15 tons, installed in order to provide sustainable, quality indicators of beneficiation of rock mass and minimal losses of coal with wastes of beneficiation. Then raw materials of class 0-75mm with the help of the feeder, which provides continuous and uniform supply in pneumatic separator, go to beneficiation in pneumatic separator.

After classification, material 0-75mm is sent to the trestle #1 where by means of the belt conveyor it is loaded into transport. Then raw material of 0-75mm class is transported to the trestle #2 by truck, where by means of the belt conveyor, supply to pneumatic separator is done.

The separator is intended for beneficiation of coal, ores and other bulk materials with bulk density up to 2.8 t/m^3, surface moisture up to 8% and material size up to 75mm. Work of the separator is based on division of rock mass, mineral particles and their splices according to the density under the influence of air flow and vibration.

As a result of pneumatic separator work, separation of thermal coal and rock mass is implemented. Sorting wastes are shipped to transport and sent to the new flat heap, and the coal goes to trestle #3, where by means of the belt conveyor it is loaded to bunker with capacity of 15 tons. The final product of beneficiated fraction is loaded in the truck body through the hole in the bunker by rolling gate. The final part of technological process is shipment of final product to the consumer.

Schematic image of the process of coal separation from the rock is presented in figure 6.

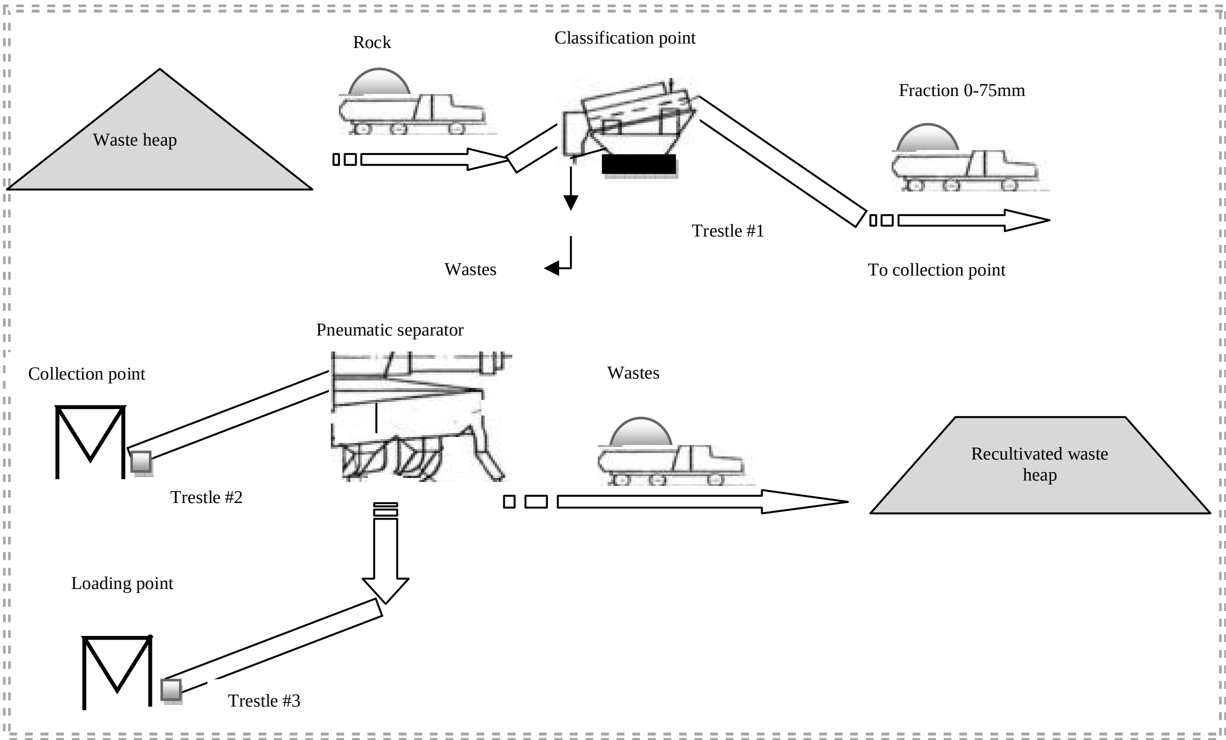

Figure 6 – General scheme of technological process of coal production

Technology of beneficiation rock mass also provides two-phasic scheme of dust catcher:

- First phase: in spiral dust-divider of the separator for cleaning of the process air from dust, circulating in air system of the separator;
- Second phase: in cyclone of type CN-24.

The flow of air from smoke exhauster DN-17 goes through air pipe and pulsator under deck of separator. Main part of air 80% goes through dust removal in it and again through smoke exhauster comes under the deck of separator. Part of remaining air goes through dust removal in cyclone of CN-24 type and with the help of exhaust ventilator of VDNu-12.5 type is emitted into atmosphere. Coal concentrate and beneficiation wastes are transported to shipment by conveyor belt with belt width – 800mm from the installation of pneumatic separator.

Most part of the equipment within this project, such as trucks, excavators, bulldozers refers to the standard type of industrial equipment used worldwide.

In 2007 it was decided to implement a JI project. Complex for waste heap processing was taken for rent, and transportation services are provided by contractors. Date of commissioning of this installation for waste heaps processing is 1st of February, 2008.

Stages of implementation are shown below:

Table 3 – Stages of project activity implementation

Data	Activity
02/02/2007	Decision-making
01/02/2008	Getting started under the project
31/12/2015	End of project activity

Duration of operational phase of the project is due to constructive possibilities of the project equipment.

The project does not require intensive pre-training. Required number of staff can receive basic training on the project site. Most workers, such as operators of heavy equipment, truck and excavators drivers, mechanics and electricians work on the project site. Project needs in technical maintenance are met by local resources: own employees for internal maintenance and contractors for repair. The project provides training. All employees must have valid professional certificates, to undergo periodically safety training and pass exams.

Important stage of this project is also recultivation of lands that were occupied by waste heaps, and their return to community. Waste from beneficiation complex (empty rock) can be used in the construction of roads and for formation of the territory of abandoned open developments and pits in order to reuse these sites. Part of barren rock forms a new heap, which has a smaller plane, at the same time freeing additional area that can be used for the needs of the community. This part of the project is obligatory but totally expensive, because of this joint implementation mechanism was one of the prominent factors of the project from the very beginning, and financial benefits under this mechanism were considered as one of the reasons of project beginning.

Technological process is environmentally justified and does not require the use of hazardous materials.

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 problem of waste heaps is very relevant now in Donbas. Waste heaps do not only eliminate large areas of land from economic circulation and lead to disruption of the ecological balance of the natural ecological community, but also are a source of increased environmental hazards. Even in a non-burning state the waste heap is a source of pollution of atmosphere, soil, adjacent waters and groundwater. This danger is increased many times by burning of the waste heap [4].

The proposed project involves the extraction of coal from the waste heap of the former coal mine. Waste heaps are often inclined to self-heating and subsequent burning, causing emissions of hazardous substances and greenhouse gases. The part of coal in the waste heaps can be as high as 28-32%, so the risk of spontaneous self-heating and burning is very high[5]. The survey shows[6], 78% of waste heaps in the Lugansk region are, or have been burning. If a waste heap has started burning, even if the fire is extinguished, it will continue burning after a while unless the fire is extinguished regularly. Burning waste heaps in Ukraine are very often not taken care of properly, especially when there is no immediate danger to population and property, i.e. if the waste heap is located at a considerable distance from a populated area, or is at the early stages of self-heating. The monitoring of the waste heaps condition is not done on a systematic and timely basis and information is frequently missing. The only way to prevent burning heap is extraction of all combustible matter, which are in residual coal after mining process. This project will reduce emissions by coal extraction from massif of the waste heaps and use of residual rocks for engineering training of land areas.Coal extracted from the waste heap, will replace coal from mines and will be used to generate electricity at power station. Also, electricity consumption from grid of Ukraine will decrease due to more economical method of coal mining that the project provides, compared to the mining method. Another positive factor of the implementation of this project is the reduction of fugitive methane emissions during coal mining. Volume of generated emission reduction units can be sold on the international trading market of emission reductions.

Emission reductions resulting from this project will come from three main sources:

- Elimination of carbon dioxide emissions sources from self-heating of the waste heap by mining coal from it;
- Reduction of the fugitive methane emissions volume because of coal mining by substitution of the coal from the mine to the coal extracted from the waste heap under the project implementation;
- Reduction of energy consumption during waste heap dismantling compared to energy consumption during coal mining.

The process of waste heap dismantling is very expensive, the investment effect of which is lower than capital investment. There are also many other negative factors in realization of such measures, such as uncertainty of early coal content in the total rock mass, instability of sales market of coal production in Ukraine. Besides, Ukraine does not resolve this issue on a systematic basis. Efforts to stop waste heaps burning and their full dismantling, corresponds the current Legislation of Ukraine on Environmental Protection. Proposed project is positively estimated by local authorities.

[4] http://terrikon.donbass.name/ter_s/290-model-samovozgoraniya-porodnyx-otvalov-ugolnyx-shaxt-donbassa.html

[5] *Geology of Coal Fires: Case Studies from Around the World*, Glenn B. Stracher, Geological Society of America, 2007, p. 47

[6] *Report on the fire risk of Lugansk Region's waste heaps*, Scientific Research Institute "Respirator", Donetsk, 2012

Detailed description of the baseline and full analysis of additionality are given in Section B of this project development document.

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

Table 4 – Estimated amount of emission reductions over the crediting period

	Years
Length of the crediting period	5
Year	Estimated annual emission reductions in tonnes of CO_2 equivalent
Year 2008	289 756
Year 2009	331 591
Year 2010	362 123
Year 2011	311 527
Year 2012	319 668
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	1 614 665
Annual average estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	328 406

Table 5 – Estimated amount of emission reductions after the crediting period

	Years
Length of the period after 2012, for which achieved emission reductions are calculated	3
Year	Estimated annual emission reductions in tonnes of CO_2 equivalent
Year 2013	324 532
Year 2014	324 532
Year 2015	324 532
Total estimated emission reductions after the crediting period (tonnes of CO_2 equivalent)	973 596
Annual average estimated emission reductions over this period (tonnes of CO_2 equivalent)	324 532

A.5. Project approval by the Parties involved:

Letter of Endorsement # 2747/23/7 dated 26/09/2012 was issued by State Environment Investment Agency of Ukraine. According to the national Ukrainian procedure Letter of Approval from Ukraine is expected after determination of the project.

SECTION B. Baseline

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

A baseline for the JI project has to be set in accordance with Appendix B to decision 9/CMP.1 (JI guidelines)[7], and with further guidance on baseline setting and monitoring developed by the Joint Implementation Supervisory Committee (JISC). In accordance with the Guidance on Criteria for Baseline Setting and Monitoring (version 3)[8] (hereinafter referred to as Guidance), the baseline for a JI project is the scenario that reasonably represents the anthropogenic emissions by sources or anthropogenic removals by sinks of GHGs that would **occur in the absence of the proposed project**.

In accordance with the Paragraph 9 of the Guidance the project participants may select either: an approach for baseline setting and monitoring developed in accordance with appendix B of the JI guidelines (JI specific approach); or a methodology for baseline setting and monitoring approved by the Executive Board of the clean development mechanism (CDM), including methodologies for small-scale project activities, as appropriate, in accordance with paragraph 4(a) of decision 10/CMP.1, as well as methodologies for afforestation/reforestation project activities. Paragraph 11 of the Guidance allows project participants that select a JI specific approach to use selected elements or combinations of approved CDM baseline and monitoring methodologies or approved CDM methodological tools, as appropriate; or, if necessary, approved CDM methodologies or methodological tools.

The baseline will then include description and justification in accordance with the “Guidelines for users of the Joint Implementation Project Design Document Form”, version 04[9], using the following step-wise approach:

Project participants have chosen the following approach regarding baseline setting, defined in the Guidance (Paragraph 9a):

- An approach for baseline setting and monitoring already taken in comparable JI cases (JI specific approach).

The Guidance applies to this project as the above indicated approach is selected as mentioned in the Paragraph 12 of the Guidance. The detailed theoretical description of the baseline in a complete and transparent manner, as well as a justification in accordance with Paragraph 23 through 29 of the Guidance should be provided by the project participants

The baseline for this project should be established in accordance with Annex B JI guidelines. In addition, the baseline should be determined by listing and describing the possible future scenarios based on conservative assumptions and choice most plausible from them. Taking into account JI special approach selected for determining the baseline, in accordance with Article 24 of JISC Guidelines, baseline is identified by listing and describing possible future scenarios based on conservative assumptions and choosing one of the most possible.

To determine the most possible future scenario barrier analysis was used.

After analyzing all variants development of the baseline, two scenarios were identified, one of which reflected the project scenario with JI initiatives. To demonstrate additionality of the project clear and transparent information was provided about similarity of approach of additionality demonstration, it was used

7 http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=2
8 http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf
9 http://ji.unfccc.int/Ref/Documents/Guidelines.pdf

in those cases where the final determination of the project was held, with the help of which comparative analysis can be performed.

Description of the possible future scenarios of the baseline are based on the following key factors: policies and legislation, directed to reforming of this sector of industry, economic situation in the country and socio-demographic factors in the relevant sectors, stability of demand on coal market, investment, fuel prices and its availability, national and/or subnational expansion plans for the energy sector.

Step 2. Application of the approach chosen

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

Sub step 2a. Identifying and listing plausible future scenarios.

Scenario 1. Continuation of the existing situation

Nowadays waste heaps are not utilized. Self-ignition and subsequent burning of waste heaps is common practice, and extinguishing measures are performed from time to time. Burning of heaps leads to fugitive greenhouse gas emissions. Coal is not extracted from the waste heaps but extracted in the mines of the region and used for energy production or other purposes. Coal extraction causes fugitive methane emissions, and contributes to the emergence of new waste heaps.

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

In certain circumstances burning waste heaps are not extinguished and their condition is not monitored properly. In some cases, for the use of thermal energy of the waste heaps [10] special heat exchangers of stationary type are used, that have direct contact with centre of rock mass combustion. Thus, received thermal energy can be used to generate electricity and heat. However, this approach does not exclude greenhouse gas emissions into the atmosphere by burning of the waste heaps. Coal will continue to be produced by underground mines and used for energy sectors purposes. Mining activities result in fugitive gas release, and the formation of more waste heaps.

Scenario 3. Production of construction materials on the basis of raw materials from waste heaps

Waste heaps are being processed in order to produce construction materials (bricks, panels, etc.). Coal in the waste heap matter is burnt during the agglomeration process[11]. Coal is produced by underground mines of the region and used for energy production or other purposes. Mining activities result in fugitive gas release, and the formation of more waste heaps.

Scenario 4. Coal extraction from waste heaps without incentives of JI mechanism

[10] *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://www.masters.donntu.edu.ua/2004/fgtu/zayanchukovskaya/library/artcl3.htm)

[11] *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.nbuv.gov.ua/portal/natural/Ecology/2007_1/Article_09.pdf

Situation under this scenario is identical to the project scenario only, the project itself does not benefit from the terms of implementation of JI project. Waste heaps are processed in order to extract coal and use it in the energy complex of industry, due to this less coal is produced by underground mines of the region.

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

Waste heaps are systematically monitored and its thermal condition is observed. Regular fire prevention measures are taken. In case of burning of waste heap fire is extinguished and measures to prevent burning in the future are held. In this case coal extracted from the waste heaps is not used for energy production, and the whole amount of coal is produced by underground mines that result in fugitive methane release and formation of more waste heaps.

Sub step 2b. Barrier analysis

Scenario 1. Continuation of existing situation

To implement this scenario, there is no need in implementing any measures, so there are no barriers.

Scenario 2. Implementation of measures on the use of thermal energy of the waste heap that burns for energy generation.

Technological barrier: This scenario is based on an experimental technology that has not yet been used. This approach is not suitable for all waste heaps, as the project owner will have to balance the availability of energy resources (i.e. waste heap location) and location of the energy consumer. Electricity production at the site addresses this issue, but requires additional capacity connections. Generally, it is also need to prove the feasibility of this technology. Besides it does not allow monitoring and controlling the emission of gases. The proposed technology can be applied only in the presence of waste heap with advanced combustion unit. Even if the probability of waste heap ignition is very high, it is currently impossible to predict the time of its outbreak and therefore to predict the start of thermal energy use released during its combustion.

Investment barrier: Considering the fact that this technology is in its initial phase of the experiment, investment into this project results in a high risk besides Ukraine is ranked as a high-risk country[12]. Investments into such kind of unproven energy projects unlikely to attract investors more than some other investment opportunities into energy industry with higher profitability. The pioneering character of the project may interest programmes of technical support and governmental incentives, but the cost of the produced energy is likely to be much higher than that of the alternatives.

Scenario 3. Production of construction materials on the basis of raw materials from waste heaps

Technological barrier: This scenario is based on known technology, which, however, 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[13]. High content of sulphur and moisture can reduce the

[12] AMB Country Risk Report: Ukraine October 29, 2010 http://www3.ambest.com/ratings/cr/reports/Ukraine.pdf

[13] *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, No.1 2007 http://www.nbuv.gov.ua/portal/natural/Ecology/2007_1/Article_09.pdf

suitability of the waste heap for processing. A large-scale and detailed exploration of the waste heap has to be performed prior to the start of the project. Pilot projects of this type are implemented only with the support of public funding[14].

Scenario 4. Coal extraction from waste heaps without incentives of JI mechanism

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, regular fire prevention and application of extinguishing measures

Technological barrier: This scenario does not include any income, but involves additional costs for the owners of the waste heaps. Monitoring of the state of waste heaps is not performed systematically, and all activities are left at the discretion of the owner of the heaps. Basically waste heaps belong to mines or regional associations of mining. Coal mines of Ukraine suffer from limited investment that often causes problems of danger because of poor conditions of extraction and financial difficulties, besides salary of miners is often delayed for several months. In this case, the waste heaps are considered as an additional burden, and mine usually do not make even minimum required measures. Self-ignition and burning of heaps are common practice. Exact statistics are not always available. From a commercial point of view fines, which are usually issued by governments, are lower than the cost of necessary measures highlighted in this project.

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 carried out systematically and actions are left to the discretion of the individual owner of the waste heaps. Mainly waste heaps belong to mines or regional coal mining associations. Coal mines in Ukraine suffer from limited funding resulting in safety problems due to complicated mining conditions and financial constraints with miners' salaries often being delayed by few months. In this case waste heaps are considered as an additional burden, and mines usually do not make even minimum measures required. Self-heating and burning of heaps are common practice. Exact statistics are not always available. From a commercial view point the fines that are usually levied by the authorities are considerably lower than the costs of all the measures outlined in this project.

Sub step 2d. Baseline identification

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

In accordance with the laws and legal norms of Ukraine waste heaps are the source of possible dangerous emissions into the atmosphere. Measures on extinguishing and monitoring of fire-hazardous waste heaps are regulated by "Mine Safety Rules"[15]. In practice, the legal use of this document is not significant because in certain cases These measures are regulated by Code of Ukraine on Administrative Violations that in Article

[14] http://www.rostovstroy.ru/archive/articles/1164.html

[15] Chapter IX, Article 7, NPAOP 10.0-1.01-10 Mine Safety Rules. Order No.62 State Committee of Ukraine on industrial security, labour protection and mining supervision – 22/03/2010 http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=z0398-10

41 provides maximum penalty for such violation[16] only 10 non-taxable minimum incomes, i.e. subsistence level according to Tax Code (Section 1, Article XX section 5 and section IV of article 169.1.1)[17,18, 19] and is 1044 hrn as of [20] July 1, 2012. Thus, the maximum penalty is 10 440 hrn (1034 Euros), that is small amount for the company. However, because of the big number of waste heaps and their large sizes, coupled with the limited resources of the owners, they usually do not make even the minimum required monitoring. In case of self-heating of the waste heap, the owners of these objects typically do not apply any measures to extinguish the fire centres, and only pay small penalties for environmental pollution by combustion products. Under such circumstances it is clear that the baseline scenario does not contradict valid laws and legal norms, taking into account their performance in Ukraine.

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

- On a project specific basis.
- 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 Guidance and methodological tools provided by the CDM Executive Board;
- Taking into account relevant national and/or sectoral policies and circumstances, local fuel availability, power sector expansion plans, and the economic situation in the coal sector. The above analysis demonstrates that the baseline chosen clearly represents the most probable future scenario taking into account the circumstances of the situation of Donbas coal sector for today;
- 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 the emission reductions will be earned only when project activity generate coal from the waste heaps, so no emission reductions can be earned due to any changes outside of project activity.
- Taking into account the uncertainties and using conservative assumptions. A number of steps have been taken in order to account for uncertainties and safeguard conservativeness:

  A. If possible, the same approaches are used to calculate baseline and project emissions when possible, that are in the National Inventory Reports (NIRs) of Ukraine. NIRs use country specific approaches and country specific emission factors that are in line with default IPCC values;

  B. Default values were used to the extent possible in order to reduce uncertainty and provide conservative data for emission calculations.

<u>Baseline Emissions</u>

For baseline emissions calculation, following assumptions were made:

1) The project will produce thermal coal that will displace the same amount of the same type of coal in the baseline scenario;

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[16] Article 41 of the Code of Ukraine on Administrative Violations – http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?page=2&nreg=80731-10
[17] http://www.profiwins.com.ua/uk/legislation/kodeks/1368.html
[18] http://www.profiwins.com.ua/uk/legislation/kodeks/1350.html
[19] http://jurisconsult.net.ua/spravochniki/382-rozmir-minimalnoyi-zarobitnoyi-plati-z.html
[20] http://minfin.com.ua/buh/minimum/

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) For mining coal that is substituted in the baseline scenario, a significant amount of electricity from the energy grid of Ukraine is consumed which leads to green house gas emissions.
5) Waste heaps of the region are vulnerable to spontaneous self-heating and burning and at some point in time will burn;
6) The waste heaps that will be dismantled during the project realization are categorized as being at risk of ignition. In other words, if they are not utilized, they will self-heat under normal circumstances.
7) The processed rock is not vulnerable to self-heating and spontaneous ignition after the coal has been removed during the processing;
8) The correction factor is applied in order to address the uncertainty of the waste heaps burning process. This factor is defined on the basis of the survey of all the waste heaps in the area that provides a ratio of waste heaps that are or have been burning at any point in time to all existing waste heaps;
9) The total amount of coal processed by the project will be burned in the heaps over the same period.
10) In order to correctly calculate the amount of thermal coal produced in mines and substituted by the coal, extracted during waste heap dismantling, it is necessary to recalculate, taking into account different indicators ash and water content of thermal coal and faction received by waste heap dismantling.

Baseline emissions come from two major sources:

1) Carbon dioxide emissions that occur during combustion of energy coal. These are calculated as stationary combustion emissions from coal in the equivalent of the amount of coal that is extracted from the waste heaps in the project scenario. This emission source is also present in the project scenario and the emissions are assumed to be equal in both project and baseline scenarios. Therefore, this emission source is not included into consideration both in the project and the baseline scenario.
2) Carbon dioxide emissions from burning waste heaps. These are calculated as stationary combustion emissions from coal in the equivalent of the amount of coal that is extracted from the waste heaps in the project scenario, adjusted by the probability of a waste heap burning at any point in time. As the baseline suggests that the current situation is preserved regarding the waste heaps burning and the waste heaps in question are at risk of burning, it is assumed that actual burning will occur. The correction factor is applied in order to address the uncertainty of the waste heaps burning process. This factor is defined on the basis of the survey of all the waste heaps in the area providing a ratio of waste heaps that are or have been burning at any point in time to all existing waste heaps.

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

Table 6 – List of constants used in the calculations of baseline emissions

Data / Parameter	Data unit	Description	Data Source	Value
p_{WHB}	dimensionless unit	Correction factor, determining the probability of spontaneous combustion of the waste heap	Report on the fire risk of Lugansk Region's waste heaps, Scientific Research Institute "Respirator", Donetsk, 2012	0.78
$NCV_{Coal,y}$	TJ/kt	Net calorific value of coal in year *y*	National Inventory Report of Ukraine[21] 1990-2010 p. 456, 462, 468 (1.A.1.a – Public Electricity and Heat Production)	2008 – 21.5 2009 – 21.8 2010 – 21.6 2011 – 21.6 2012 – 21.6
$OXID_{Coal,y}$	ratio	Carbon oxidation factor of coal in year *y*	National Inventory Report of Ukraine 1990-2010 p. 459, 465, 471 (1.A.1.a – Public Electricity and Heat Production)	2008 – 0.963 2009 – 0.963 2010 – 0.962 2011 – 0.962 2012 – 0.962
$k^{C}_{Coal,y}$	t C/TJ	Carbon content of coal in year *y*	National Inventory Report of Ukraine 1990-2010 p. 458, 464, 470 (1.A.1.a – Public Electricity and Heat Production)	2008 – 25.95 2009 – 25.97 2010 – 25.99 2011 – 25.99 2012 – 25.99
$A_{coal,y}$	%	Average ash content of thermal coal extracted in Lugansk region, Ukraine	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine, and Lugansk 2010 (see Annex 4). Indicators for thermal coal.	2008 – 37.20 2009 – 38.40 2010 – 38.10 2011 – 38.10 2012 – 38.10
$W_{coal,y}$	%	Average water content of thermal coal extracted in Lugansk region, Ukraine	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine, Lugansk 2010 (see Annex 4). Indicators for thermal coal.	2008 – 7.2 2009 – 7.4 2010 – 7.4 2011 – 7.4 2012 – 7.4

Calculation results are presented in metric tons of carbon dioxide equivalent (tCO_2e), 1 metric ton of carbon dioxide equivalent is equal to 1 metric ton of carbon dioxide (CO_2), i.e. 1 tCO_2e = 1 tCO_2.

Baseline emissions are calculated as follows:

[21] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5888.php

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

where:

BE_y, - Baseline emissions in period *y*, tCO_2e,

$BE_{WHB,y}$ - Baseline emissions related to waste heaps combustion in period *y*, tCO_2e.

Baseline emissions related to waste heaps combustion are in turn calculated as:

$$BE_{WHB} = \frac{FC_{BE,Coal,y}}{1000} \cdot p_{WHB} \cdot NCV_{Coal,y} \cdot OXID_{Coal,y} \cdot k^{C}_{Coal,y} \cdot 44/12, \qquad (Equation\ 2),$$

where:

$FC_{BE,Coal,y}$ - Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation in period *y*, t;

ρ_{WHB} - Correction factor, determining the probability of spontaneous combustion of the waste heap, dimensionless unit;

$NCV_{Coal,y}$ - Net calorific value of coal in period *y*, TJ/kt [22];

$OXID_{Coal,y}$ - Carbon oxidation factor for coal in period *y*, ratio [23];

$k^{C}_{Coal,y}$ - Carbon content of coal in period *y*, t C/TJ [24];

$\frac{44}{12}$ - Ration between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2

1/1000 - Physical transformation [t] in [kt] for calculation purposes.

In order to correctly calculate the amount of thermal coal produced in mines and substituted by the coal, extracted during waste heap dismantling, it is necessary to recalculate, taking into account different indicators ash and water content of thermal coal and faction received by waste heap dismantling. If to extract moisture and substances from the mass of carbonaceous rock that are not consumed during combustion, and to turn into ash, we will get conditionally ideal coal with no water and ash content. Therefore, to obtain coal with averaged characteristics over Ukraine it is necessary to add averaged water and ash content to this ideal coal. In addition to moisture and ash coal (carbonaceous rock) also has sulphur, but its amount does not exceed few percent[25], its content in carbonaceous rock of waste heap always less, then in mined coal therefore for calculation of amount of coal that has been mined, that is substituted by the coal from the waste heap, this indicator can be neglected. Amount of coal that would have been mined in the baseline scenario and combusted for energy production is calculated as follows:

[22] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[23] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[24] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[25] http://masters.donntu.edu.ua/2009/feht/semkovskiy/library/article9.htm

$$FC_{BE,coal,y} = FR_{coal,y} \cdot \frac{\left(1 - \frac{A_{rock,y}}{100} - \frac{W_{rock,y}}{100}\right)}{\left(1 - \frac{A_{coal,y}}{100} - \frac{W_{coal,y}}{100}\right)} \quad \textit{(Equation 3)},$$

where:

$FR_{coal,y}$ - Amount of sorted fraction, extracted from the waste heaps as a result of the project implementation in period *y* that came to blending with further combustion in thermal power plants, t;

$A_{rock,y}$ - Average ash content of sorted fraction extracted from waste heaps as a result of the project implementation in period *y*,%;

$W_{rock,y}$ - Average water content of sorted fraction extracted from waste heaps as a result of the project implementation in period *y*,%;

$A_{coal,y}$ - Average ash content of thermal coal extracted in Lugansk region of Ukraine in period *y*, %;

$W_{coal,y}$ - Average water content of thermal coal extracted in Lugansk region of Ukraine in period *y*, %.

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

Table 7 – Amount of coal that would be mined in the baseline scenario

Data/Parameter	$FC_{BE,Coal,y}$
Data unit	t
Description	Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation in period *y*, t.
Time of determination/monitoring	Monthly
Source of data (to be) used	Project owner records
Value of data applied (for ex ante calculations/determinations)	As provided by the project owner
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated according to the equation (3), Section B.1.
QA/QC procedures (to be) applied	According to the project owner's rules.
Any comment	No

Table 8 – Amount of sorted fraction, which is extracted from the waste heap as a result of the project activity

Data/Parameter	$FR_{Coal,y}$
Data unit	t

Description	Amount of sorted coal containing fraction (0-75mm), removed from the waste heap and separated from the rock as a result of project activity in period *y*.
Time of determination/monitoring	Monthly
Source of data (to be) used	Data of the company. Data recorded by scales
Value of data applied (for ex ante calculations/determinations)	Provided by the 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	In accordance with national standards
Any comment	No

Table 9 – Average ash content of sorted fraction extracted from waste heap

Data/Parameter	$A_{rock,y}$
Data unit	%
Description	Average ash content of sorted fraction (0-75mm), extracted from the waste heap in period *y*, %
Time of determination/monitoring	Annual monitoring
Source of data (to be) used	Data of the company
Value of data applied (for ex ante calculations/determinations)	As provided by the project owner
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Laboratory studies
QA/QC procedures (to be) applied	According to national standards
Any comment	If data on the average ash content of sorted fractions and the average water content of sorted fractions, which are extracted from waste heap in period *y* are not available to the developer, or are irregular with a high level of uncertainty, they are taken equal to the relevant nationwide indicators.

Table 10 – Average water content of sorted fractions extracted from waste heap

Data/Parameter	$W_{rock,y}$
Data unit	%
Description	Average water content of sorted fraction (0-75mm), extracted from the waste heap in period *y*.
Time of	Annual monitoring

determination/monitoring	
Source of data (to be) used	Data of the company
Value of data applied (for ex ante calculations/determinations)	As provided by the project owner
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Laboratory research
QA/QC procedures (to be) applied	According to the national standards
Any comment	If data on the average ash content of sorted fractions and the average water content of sorted fractions, which are extracted from waste heap in period *y* are not available to the developer, or are irregular with a high level of uncertainty, they are taken equal to the relevant nationwide indicators.

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 reduction of anthropogenic emissions from sources that is provided by the project activity is additional to any other emission reductions:

Step 1. Indication and description of the approach applied

According to Paragraph 44 (b) of the Annex 1 of the Guidance "Guidance on Criteria for Baseline Setting and Monitoring" version 03, additionality can be demonstrated by provision of traceable and transparent information showing that the same approach for additionality demonstration has already been taken in cases for which determination is deemed final and which can be regarded as comparable, using the criteria outlined for baseline determination in paragraph 12 of the Guidance. It was decided to refer to the positively determined project "Waste Heap Dismantling in Lugansk Region of Ukraine with the Aim of Reduction Greenhouse Gases Emissions to Atmosphere" (ITL Projects ID: UA1000327). This, project already implemented or the one that will be implemented with comparable conditions (the same measures to reduce the negative impact of GHG, the same country, similar technology, similar scale), will have as a result reduction of anthropogenic emissions by sources or enhancement of net removals by sinks that are additional to any that would have been in the absence of the project, and also relevant to this project.

Step 2. Application of the approach chosen

The following steps are performed to demonstrate additionality of this project:

Sub step 2a: 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 in the absence the project.

The project "Waste Heap Dismantling in Lugansk Region of Ukraine with the Aim of Reduction Greenhouse Gases Emissions to Atmosphere" is selected as the comparable JI project. 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. 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:

http://ji.unfccc.int/JIITLProject/DB/MWT8YE8A68MBKRG48QJ8Q4O44M7BVY/details

Sub step 2b: Demonstrate that the identified project is a comparable project (to be) implemented under comparable circumstances:

In accordance with paragraphs 44 and 12 of Guidelines on criteria for baseline setting and monitoring version 03 we will demonstrate that projects are implemented under comparable circumstances:

1) Both projects propose **the same measures on GHG emissions reduction into the atmosphere**: extraction of coal from waste heaps, formed during the operation of coal mines that leads to reduction of GHG emissions from spontaneous combustion of waste heaps. Besides additional amount of thermal coal is received, which will replace coal from mine and partly meet the needs of the energy sector. Same sources of GHG emissions are included in the boundaries of both projects
2) **Projects are implemented in the same geographical area.**
   Both projects are implemented in Lugansk region, Ukraine.
3) **Both projects have a similar scale**:
   Projects are Joint Implementation large-scale projects. Capacity of equipment for processing rock mass in both projects is 504 thousand tons of raw materials per year. That is, the proposed project is identical according to this indicator to compared one.
4) **Both projects are implemented under identical conditions of legislation:**
   During the time interval between the dates of implementation of two JI projects regulatory and legal frameworks bases have not undergone significant changes. The situation around the coal industry remained stable.
5) **Both projects introduce similar technology:**
   Technology, which is implemented in the proposed and comparable projects is similar. In both projects, heaps are dismantled using standard excavators and bulldozers. Material from heaps is transported to installation for rock mass beneficiation using trucks. In both projects, dry method of rock beneficiation is used. Pneumatic separator is facility for processing waste heaps in both projects, where separation of coal from the rocks is implemented by pulsing regime of forcing air through special holes on the corrugated surface. Both technologies are modern and efficient, aimed to separating combustible materials from rock

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

Step 3: Justification why determination of the comparable project refers to this project

The project "Waste Heap Dismantling in Lugansk Region of Ukraine with the Aim of Reduction Greenhouse Gases Emissions to Atmosphere" and the proposed project are implemented within the same geographic region of Ukraine – the Donbas coal mining region. The implementation timeline is quite similar. Projects will share the same investment profile and market environment. These 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 [26] burdened by many problems. The market for the extracted coal will also be similar for 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

[26] http://www.necu.org.ua/wp-content/plugins/wp-download_monitor/download.php?id=126

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[27].

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.

Indicators	2008	Note
Corruption index of Transparency International [28]	134 position from 180	Index of corruption
Rating of business practices of The World Bank (The Doing Business) [29]	139 position from 178	Rating of conduct of business (ease of company opening, licensing, staff employment, registration of ownership, receipt of credit, defence of interests of investors)
The IMD World Competitiveness Yearbook[30]	54 position from 55	Research of competitiveness (state of economy, efficiency of government, business efficiency and state of infrastructure)
Index of Economic Freedom of Heritage Foundation[31]	133 position from 157	Determination of degrees of freedom of economy (business, auction, financial, monetary, investment, financial, labour freedom, freedom from Government, from a corruption, protection of ownership rights)
Global Competitiveness Index of World Economic Forum [32]	72 position from 134	Competitiveness (quality of institutes, infrastructure, macroeconomic stability, education, development of financial market, technological level, innovative potential)

Table 11 – International ratings of Ukraine

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. Comparison of commercial lending rates in Ukraine and in the euro zone for loans for 4 years in Euros is presented in the figure below:

[27] http://www.ier.com.ua/files/publications/Policy_papers/German_advisory_group/2009/PP_09_2009_ukr.pdf
[28] http://cpi.transparency.org/cpi2011/in_detail/
[29] http://www.doingbusiness.org/rankings
[30] http://www.imd.org/research/publications/wcy/upload/scoreboard.pdf
[31] http://www.heritage.org/index/country/ukraine
[32] http://reports.weforum.org/global-competitiveness-2011-2012/

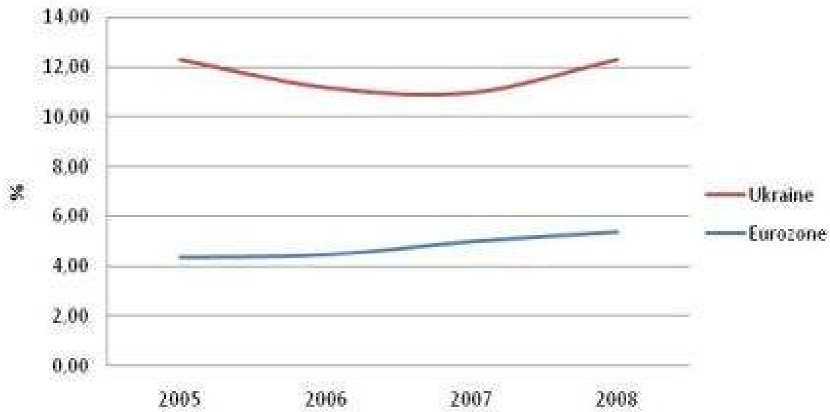

Figure 7 – Commercial lending rates, Euros, for four years

As stated at the Organization for Economic Co-operation and Development 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 and new Tax Code on 1 January 2011 but still contain unsatisfactory elements and pose a risk for foreign investors[33]. 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.

Subject to the above information, we can conclude that determination of the project “Waste Heap Dismantling in Lugansk Region of Ukraine with the Aim of Reduction Greenhouse Gases Emissions to Atmosphere” is relevant for this project.

Outcome of the analysis: According to Paragraph 44 (b) of Appendix 1 of “Guidance on criteria for baseline setting and monitoring”, Version 03, additionality was demonstrated by providing traceable and transparent information that similar approach to demonstrating additionality has already been applied in those cases, where determination is considered final and can be taken as comparable one using criteria for determining the baseline in Paragraph 12 of Guidance, as well as traceable and transparent information that has received

[33] Foreign Direct Investment in Ukraine – Donbas, Philip Burris, Problems of foreign economic relations development and attraction of foreign investments: regional aspect., ISSN 1991-3524, Donetsk, 2007. p. 507-510

positive determination by accredited independent entity that comparative project “Waste Heap Dismantling in Lugansk Region of Ukraine with the Aim of Reduction Greenhouse Gases Emissions to Atmosphere” (ITL Projects ID: UA1000327) is implemented under comparable circumstances (similar technologies, similar technology, similar implementation time, similar project scale), would result in a reduction of anthropogenic emissions 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. Overall, this project is additional.

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

According to the agreement No. 10/07-123 dated January 25, 2008 “REMSTROYPROEKT 2002” LLC received from the CUSTOMER a waste heap, deployed on the territory of Kalininska Village Council, Lugansk region, with total area of 2.2 hectares in the amount of 2,192,000 tons, for performance of works on mining engineering recultivation of the waste heap in order to implement JI project on reducing greenhouse gas emissions, what is provided by Article 6 of the Kyoto Protocol to UN Framework Convention on Climate Change dated 09/05/92. “REMSTROYPROEKT 2002” LLC rents equipment for processing rock mass of waste heap in LLC “AUTO-GAS SERVIS 2007”. “BC “DOM-STOY” LLC is the contracting company that provides collecting and transportation of rock. “REMSTROYPROEKT 2002” LLC is the owner of emission sources, where the implementation of JI project is planned.

Coal extracted from the waste heap will be supplied to the thermal coal market partially replacing coal that would be mined in the baseline scenario in the coal mines. In turn, the project scenario provides project GHG emissions in the atmosphere related to diesel burning by trucks and indirect carbon dioxide emissions during electricity consumption by technological equipment.

According to the baseline, all amount of coal is extracted in coal mines, and delivered to in the energy industry sector for energy generation. Coal from coal mines is replaced by extracted coal from the waste heap. This source of emissions is equivalent to the source, present in the project scenario, so source of GHG emissions from the burning of this coal at TPP excluded from consideration. In addition, coal extraction by mining method leads to fugitive CMM emissions, warming potential of which is in 21 times higher than CO_2. Coal mine utilizes different types of energy, but electricity consumption takes the bulk of the energy balance of coal enterprises, about[34] 90%. The remaining 10% of the balance of energy consumption is not considered in order to provide conservativeness. Emission sources in this PDD are presented in accordance with the provisions of Articles 13 and 14 of the JISC Guidance.

Leakage:

Leakage is the net change of anthropogenic emissions by sources and/or removals by sinks of GHGs which is done 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 of anthropogenic emissions by sources and/or removals by sinks of GHGs come from two sources:

1) Leakages caused by fugitive methane emissions during coal production in coal mines;
2) Leakages related to electricity consumption from the grid of Ukraine during coal production in the mine.

[34] *THE EFFECTIVE METHOD OF ELECTRICITY CONSUMPTION CONTROL AT COAL MINES Gryaduschy B.A., Doctor of Technical Sciences, DonUGI, Lisovoy G.N., Myalkovsky V.I., ChehlatyN.A., Candidates scientific degree of Technical science, NIIGM named after Fedorov M. M., Donetsk, Ukraine*

In the baseline scenario coal production by mining method is implemented (underground coal mines), while *fugitive emissions of coal mine methane* appear. In the project scenario, additional amount of thermal coal is extracted, using dry method of rock mass beneficiation of the waste heap, which otherwise would be burned. Therefore, coal produced by the project activity substitutes the coal would have been otherwise mined in the baseline scenario that would cause fugitive methane emissions. Thus, coal extraction from the waste heap will cause methane emissions.

As reliable and accurate national data on fugitive methane emissions associated with the production of coal are available, project participants used this data to calculate the amount of fugitive CH_4.

This leakage is measurable: through the same procedure as used in 2006 IPCC Guidelines[35] (See Volume 2, Chapter 4, p. 4-11) and also used in CDM approved methodology ACM0009[36] Version 03.2 (p. 8). Activity data (in our case amount of coal extracted from the waste heap which is monitored directly) is multiplied by the multi-project carbon emission factor for fugitive methane emissions from coal mining (which is sourced from the relevant national study – National Inventory Report[37] of Ukraine under the Kyoto Protocol) and conversion coefficients. It is important to mention that IPCC and relevant National Inventories take into account raw amount of coal that is being mined in these calculations whereas in the PDD coal extracted from the waste heaps is high quality coal concentrate. Therefore, approach taken in the PDD is conservative as in coal mining more ROW coal should be mined causing more fugitive methane emissions to produce equivalent amount of high quality coal concentrate.

Electricity consumption and related with this greenhouse gas emissions during waste heap dismantling will be included in the calculation of the project emissions. *Carbon dioxide emissions as a result of electricity consumption*, during coal mining in the amount that equals to the project amount of coal, is leakage that can be taken into account on the basis of State Statistics Committee[38] about the specific electricity consumption during coal production in the mines of Ukraine in the relevant year. Data in this link indicates that the specific level of electricity consumption during coal mining is higher than the specific electricity consumption from grid in the project scenario.

Leakages as a result of consumption of other types of energy carriers during coal production in the mines are insignificant in comparison to the leakages as a result of electricity consumption[39], so in this respect, and for reasons of conservatism, we will take them equal to zero.

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 fact that commercial output (coal), connected with fewer GHG emissions during production, will come on steam coal market and will substitute commercial output in the baseline scenario that is characterized by higher GHG emissions during its production. 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. This methodological approach is very common and is applied in all renewable energy projects (substitution of grid electricity with renewable-source electricity, for example, project UA1000256 Construction of Wind Park Novoazovskiy), projects in cement sector (e.g.

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35 http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf

36 http://cdm.unfccc.int/UserManagement/FileStorage/K4P3YG4TNQ5ECFNA8MBK2QSMR6HTEM

37 http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5888.php

38 http://www.ukrstat.gov.ua/

39 *THE EFFECTIVE METHOD OF ELECTRICITY CONSUMPTION CONTROL AT COAL MINES Gryaduschy B.A., Doctor of Technical Sciences, DonUGI, Lisovoy G.N., Myalkovsky V.I., ChehlatyN.A., Candidates scientific degree of Technical science, NIIGM named after Fedorov M. M., Donetsk, Ukraine www.mishor. esco.co. ua/2005/Thesis/10. doc*

JI0144 Slag usage and switch from wet to semi-dry process at Volyn-Cement, Ukraine[40]), projects in metallurgy sector (e.g. UA1000181 Implementation of Arc Furnace Steelmaking Plant "Electrostal" at Kurakhovo, Donetsk Region[41]) and others.

These leakages are significant and will be included in the calculation of the project emission reductions under the project. Procedure for ex ante estimate and quantification of this source of leakage is provided below:

Table 12 – List of constants used in the calculations of leakage

Data / Parameter	***Data unit***	***Description***	***Data Source***	***Value***
GWP_{CH4}	$tCO_2e/ t\ CH_4$	Global warming potential of methane	IPCC Second Assessment Report[42]	21
ρ_{CH4}	t/m^3	Methane density	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 4: Fugitive Emissions, Page 4.12[43]. Value was converted from converted $Gg \cdot m^{-3}$ to t/m^3. IPCC default value under standard physical conditions (t=293,15 K; p=101,2325 kPa)	0.00067
$EF_{CH_4,CM}$	m^3/t	Fugitive methane emissions factor during coal mines operation	National Inventory Report of Ukraine 1990-2010, p. 90	25.67
$N^e_{coal,y}$	MWh/t	Average consumption of electricity per tonne of extracted coal in Ukraine in year *y*	State Statistics Service of Ukraine. Fuel and energy resources of Ukraine, Statistical Yearbook збірник[44], [45], [46] p. 300, Kyiv 2009 (See Annex 5)	2008 – 0.0878 2009 – 0.0905 2010 – 0.0926 2011 – 0.0842
$EF_{grid,y}$	tCO_2/MWh	Specific indirect carbon dioxide emissions during the consumption of electric energy by the 2nd class electricity	National Environmental Investment Agency Orders: No.62 dated 15.04.2011[47], No.63 dated 15.04.2011[48] No.43 dated 28.03.2011[49] No.75 dated 12.05.2011[50]	2008 – 1.219 2009 – 1.237 2010 – 1.225 2011 – 1.227 2012 – 1.227

[40] http://ji.unfccc.int/JI_Projects/DB/P1QYRYMBQCEQOT0HOQM60MBQ0HXNYU/Determination/Bureau%20Veritas%20Certification1266348915.6/viewDeterminationReport.html
[41] http://ji.unfccc.int/JIITLProject/DB/4THB9WT0PK6F721UQA5H6PTHZEXT4C/details
[42] http://www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf Page 22.
[43] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf
[44] http://www.ukrstat.gov.ua/druk/katalog/m-e_res/Pal_en_res.zip
[45] http://www.ukrstat.gov.ua/druk/katalog/kat_u/2012/sz_per_2010.zip
[46] http://www.ukrstat.gov.ua/druk/katalog/kat_u/2012/sz_per_2010.zip
[47] http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[48] http://www.neia.gov.ua/nature/doccatalog/document?id=127172
[49] http://www.neia.gov.ua/nature/doccatalog/document?id=126006
[50] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

		consumers according to Procedure for determining consumers' classes.		

Leakages in period *y* are calculated as follows:

$$LE_y = LE_{CH_4,y} + LE_{EL,y}$$ *(Equation 4),*

where:

LE_y - Leakages as a result from the project implementation in period *y*, tCO_2e;

$LE_{CH_4,y}$ - Leakages related to the fugitive methane emissions during the operation of mines in period *y*, tCO_2e;

$LE_{EL,y}$ - Leakages as a result of electricity consumption from energy grid during coal mining in period *y*, tCO_2e.

Leakages related to the fugitive methane emissions during the operation of mines in period *y* are calculated as follows:

$$LE_{CH_4,y} = -FC_{BE,Coal,y} \cdot EF_{CH_4,CM} \cdot \rho_{CH_4} \cdot GWP_{CH_4}$$ *(Equation 5),*

where:

$FC_{BE,Coal,y}$ - Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation in period *y*, t;

$EF_{CH_4,CM}$ - Fugitive methane emissions factor during coal mining, m^3/t;

ρ_{CH4} - Methane density[51], t/m^3;

GWP_{CH4} - Global Warming Potential of Methane, tCO_2e/tCH_4.

Amount of coal that would be mined in the baseline scenario and combusted for energy production is calculated according to equation (3) of this PDD:

Leakages related to electricity consumption from energy grid during coal mining in period *y* are calculated as follows:

$$LE_{EL,y} = -(FC_{BE,Coal,y} \cdot N^e_{coal,y} \cdot EF_{grid,y})$$ *(Equation 6),*

where:

$FC_{BE,coal,y}$ - Amount of coal mined in the baseline scenario and combusted for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation in period *y*, t;

$N^E_{coal,y}$ - Average consumption of electricity per tonne of extracted coal in Ukraine in period *y*, MWh/t;

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

$EF_{grid,y}$ - Specific indirect carbon dioxide emissions during the consumption of electric energy under the project activity.

The table below demonstrates all sources of GHG emissions under the project

Table 13 – Demonstration of emission sources

	Source	Gas	Included/Excluded	Justification/Explanation
Baseline scenario	Waste heap burning	CO_2	Included	Main emission source
	Coal combustion	CO_2	Excluded	This coal is extracted from the waste heaps. This emission source is equal to the one present in the baseline scenario and, therefore is excluded from consideration.
Project scenario	Coal combustion	CO_2	Excluded	This coal is extracted from the waste heaps. This emission source is equal to the one present in the baseline scenario and, therefore is excluded from consideration.
	Electricity consumption from the grid as a result of project activity	CO_2	Included	Main emission source
	Burning diesel fuel by trucks as a result of project activity	CO_2	Included	Main emission source
Leakage	Leakages related to the fugitive methane emissions during the operation of mines	CH_4	Included	These emissions are attributable to baseline scenario, which provides fugitive methane emissions as a result of coal production by coal mining
	Leakages as a result of electricity consumption from the grid at coal production in mines	CO_2	Included	These emissions are attributable to baseline scenario, which provides coal production in coal mines
	Consumption of other types of energy carriers during mine operating	CO2	Excluded	These leakages are not significant, but also for reasons of conservatism, they are excluded from consideration.

<u>Baseline scenario</u>

The baseline scenario is the continuation of the existing situation. Coal is produced by the underground mines and is used for energy generation. Waste heaps are often self-heating and burning that causes carbon dioxide emissions into the atmosphere. Emission sources in the baseline that are included into the project boundary are:

• CO_2 emissions related to waste heap combustion.

Project scenario

Project scenario provides GHG emissions from combustion of diesel fuel by transport operating in the project activity and from electricity consumption by technological equipment.

Emission sources in the project scenario are:

• Project emissions as a result of consumption of diesel fuel by project implementation in period *y*;
• Project emissions as a result of electricity consumption from the grid during the project implementation in period *y*.

Leakage

The proposed project provides availability of leakages, related to the operation of coal mines.
Emission sources are:

• Fugitive CMM emissions during operation of coal mines;
• Indirect CO_2 emissions related to electricity consumption during the operation of coal mines.

For demonstration of the boundaries of the project and emission sources in the baseline and project scenarios there are following figures:

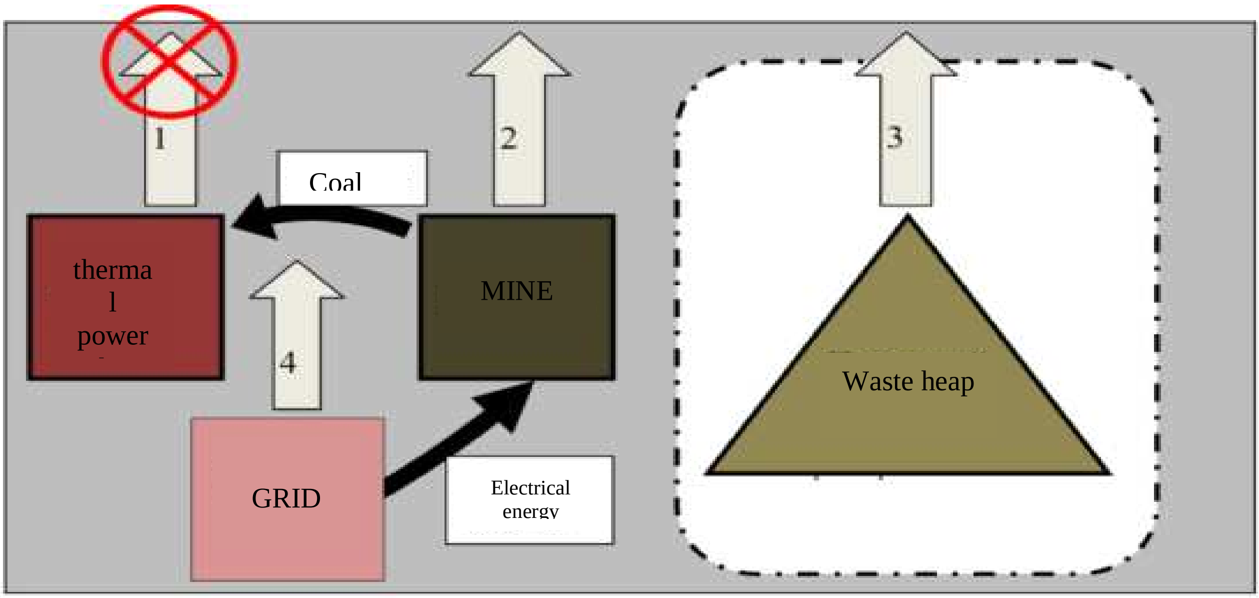


Figure 8 – Project boundaries in the baseline scenario

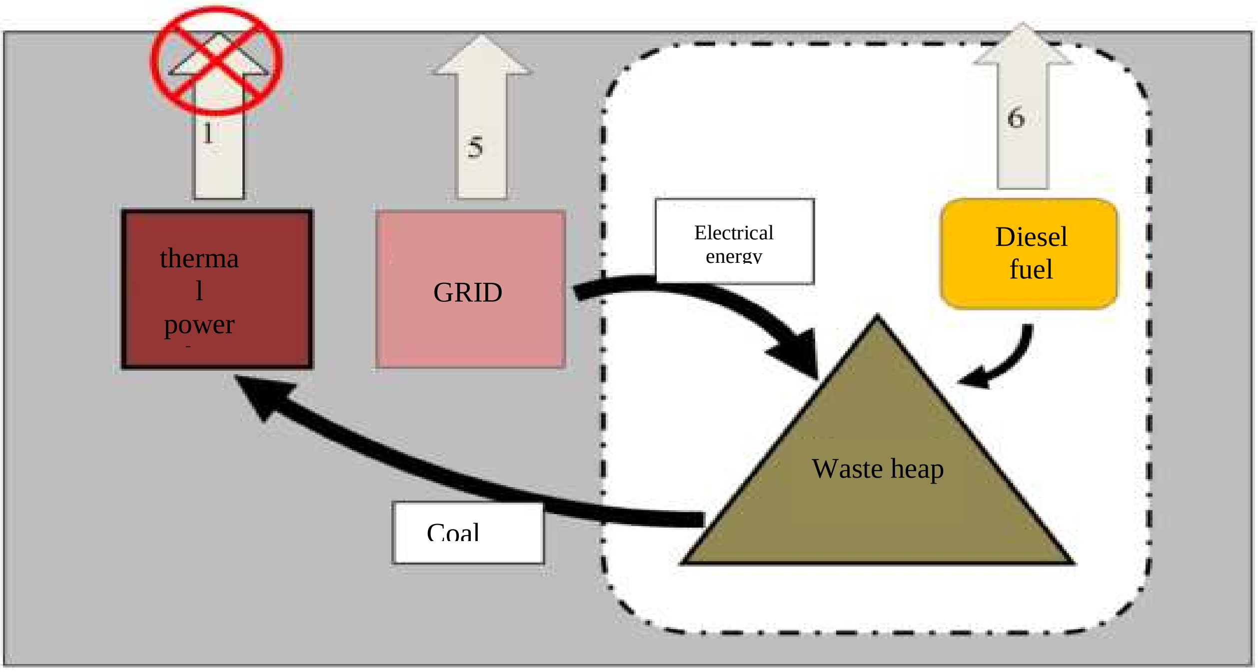
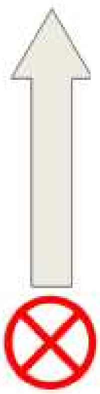


Figure 9 – Project boundaries in the project scenario



Sources of greenhouse gas emissions on the schemes

1. Emissions of carbon dioxide by coal burning
2. *Leakages of methane during mining*
3. *Emissions of carbon dioxide* during waste heap burning
4. Leakages of carbon dioxide during electricity consumption from the grid during operation of mine
5. Emissions of carbon dioxide in electricity consumption from the grid during dismantling
6. Emissions of carbon dioxide by diesel fuel burning during operation of equipment at the waste heap

- Emissions by coal burning excluded from consideration

Figure 10 – Symbols in schematic diagram of the project boundaries

B.4. Further baseline information, including the date of baseline setting and the names of the persons/entities setting the baseline:

Date of baseline setting: 13/08/2012

Name of person/entity setting the baseline:

"REMSTROYPROEKT 2002" LLC is initiator of this project and developer of the project design documentation simultaneously. This company specializes in the waste heaps dismantling and implements JI project under the Kyoto Protocol. "REMSTROYPROEKT 2002" LLC is a participant of JI project.

Contact details:

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РОЗДІЛ C. Duration of the project/crediting period

C.1. Starting date of the project:

Starting date of the project is February 1, 2008 – decision-making on JI project implementation.

C.2. Expected operational lifetime of the project:

Expected operational lifetime of the project is estimated to last until 31/12/2015. Thus expected operational lifetime of the project will be 7 years and 11 months, or 95 months.

C.3. Length of the crediting period:

Start of the crediting period: 01/02/2008.
End of the crediting period: 31/12/2012.
Length of the crediting period: 4 years and 11 months or 59 months.
Starting date of generating emission reductions: 01/02/2008 – beginning of work on waste heap dismantling (this date is shown in the order about the beginning of installation operation for processing rock mass).

Emission reductions generated after the crediting period may be used in accordance with an appropriate mechanism under the UNFCCC. The crediting period can extend subject to the approval by the Host Party.

Section D. Monitoring plan

D.1. Description of monitoring plan chosen:

Description and explanation of the monitoring plan chosen a step-wise approach is used:

Step 1. Indication and description of the approach chosen regarding monitoring

Option (a) provided by the document "Guidelines for users of the Joint Implementation project design document form" Version[52] 04: JI specific approach is used for this project and therefore will be used for establishment of a monitoring plan.
Among other, monitoring plan includes the following:

- Collecting and archiving all relevant data necessary for estimating or measuring anthropogenic emissions by sources of GHGs occurring within the project boundary 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 boundaries during the crediting period;
- Identification of all potential sources of, and the collection and archiving of data on increased anthropogenic emissions by sources of GHGs outside the project boundaries which are significant and reasonably attributable to the project during the crediting period.
- Quality assurance and control procedures for the monitoring process;
- Procedures for the periodic calculation of the reductions of anthropogenic emissions by sources by the proposed JI project, and for leakage effects, if any.

Step 2. Application of the approach chosen

Key factors that affect emissions level under the project and under the baseline scenario were taken into account and described in detail in section B.1. The project activity will include monitoring of greenhouse gas emissions in the project and baseline scenarios. Detailed information on emission sources of the project and baseline is presented hereunder. The data relating to the monitoring of GHG emission reductions will be archived and kept at least 2 years after last transfer of emission reduction units to the buyer.

[52] http://ji.unfccc.int/Ref/Documents/Guidelines.pdf

Baseline scenario

The basic scenario is the continuation of the existing situation. Coal is extracted in coal mines and used for energy production. Waste heaps are often prone to burning and self-heating, which results in CO_2 emissions into the atmosphere. The sources of emissions in the baseline scenario that are included in the project boundaries are:

- CO_2 emissions related to burning of the waste heap.

Project scenario

Project scenario provides GHG emissions from diesel fuel combustion by transport operating in the project activity and from electricity consumption by technological equipment.

Emission sources in the project scenario are:

- Project emissions because of diesel fuel as a result of the project implementation in period *y*;
- Project emissions due to electricity consumption from the grid during project implementation in period *y*.

Leakage

The proposed project provides availability of leakages related to the operation of coal mines.
Sources of leakages are:

- Fugitive CMM emissions during the operation of coal mines;
- Indirect CO_2 emissions related to electricity consumption during the operation of coal mines.

Carbon dioxide emissions as a result of combustion of thermal coal are calculated as emissions from stationary burnt coal in the amount equivalent to amount of coal extracted from heaps in the project scenario. This emission source can also be found in the project scenario and it is assumed that emissions are equivalent in the project and in the baseline scenarios. Therefore, this emission source is not considered in both cases.

Emission reduction as a result of the project implementation will be ensured by three main sources:

- Removing sources of GHG emissions as a result of burning of waste heaps by extracting from it fractions, containing coal;
- Elimination of fugitive CMM emissions related to the extraction of coal in the mines, by replacing this coal to the coal, extracted under the project scenario;
- Reduction of electricity consumption during dismantling waste heap in comparison with energy consumption during extraction of the same amount of coal from the mine.

During any period of monitoring data on the following parameters should be collected and registered:

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

For measurement of this parameter data of the company commercial is used. Monthly electricity bills are supporting document on consumption. This parameter is recorded using special electric energy meters. Meter is placed immediately after current transformers at the industrial site. This meter registers all electricity consumed in framework of the project as access to the electricity supply is carried out only through him. Indications are used for commercial accounts with the company-electricity supplier. Regular cross-checks with the energy supply company are performed. Monthly and annual reports are based on the monthly bills.

2. *Amount of diesel fuel combusted as a result of the project activity in the relevant period y.*

For the metering of this parameter the commercial data of the company is used. For confirmation of the amount of fuel consumed completion certificates are used from the contractor. Company-contractor performs works on dismantling waste heap, rock mass transportation to industrial sites and other transportation services required by the project activity. At the industrial site diesel fuel consumption is done only by transport project, but if other equipment is used, fuel consumption by this equipment is also included. Amount of consumed diesel fuel in the accounting records is given in liters, so for the purposes, for monitoring purposes unit of measurement of the amount of this fuel is converting in tonnes using density that equals 0.85 kg/l [53]. Regular cross-checks are carried out between tenant and landlord regarding trucks mileage. The monthly and annual reports are based on these data.

3. *Amount of sorted fraction containing coal (0-75mm), which was extracted from the waste heap and separated from the rock as a result of the project activity in the relevant period y.*

This parameter is tracked based on internal company documents. To confirm the amount of extracted fraction (0-75mm) acceptance certificates of coal products are used. To calculate the GHG emissions reductions only those products that were shipped to the buyer, is taken into account and refers to the project activity. Weighing is done at the industrial site of Central Concentrating Mill “Mayak” using special automobile scales. The final product of enrichment (thermal coal) is loaded to the trucks of the consumer. Then the truck passes

[53] GOST 3868-99 Diesel fuel. Specifications. The density of 0.85 kg/l is taken as average value between the two types of diesel fuel: summer and winter (data from Table 1). Values are converted from kg/m^3 into kg/l.

weighing on automobile scales. For providing full control over this parameter, regular cross-checks with purchasers of coal products are done. At the end of the month monthly technical report is prepared on its basis annual reports are prepared. Information on the volume of production of ROM coal is stored in paper and electronic forms.

4. *Ash and water content extracted as a result of the project activity fraction containing coal (0-75mm) in relevant period y.*

These parameters are provided based on the conclusions of independent laboratory that conducts regular periodic analysis of samples of extracted from the waste heap coal. Key indicators of the coal quality are the calorific value, ash content, water content and sulphur content. In the conclusions of laboratory there is clear and transparent information on the number of coal party that is shipped, indicators of ash and water content. Analysis of extracted coal is implemented 3 times a month. Also research of extracted coal samples may be held at the request of the consumer in contrast to established internal regulations. Results of laboratory studies are stored in paper and electronic forms. If the data on the average ash content of sorted fraction and average water content of sorted fraction, extracted from the heap in period y is not available to the developer, or is irregular with a high level of uncertainty, they are taken equal to the corresponding general Ukrainian standards. If necessary, the analysis of coal samples can be made at the request of the buyer.

More detailed information on the parameters used in the baseline scenario presented in Annex 2 of this PDD.

Data and parameters that were not monitored during the whole crediting period, are determined only once (and remain constant during the whole crediting period) and are available at the stage of determination of the PDD, are listed in the table below:

Table 14 – List of constants used in calculations of emissions

Data / Parameter	*Data unit*	*Description*	*Data Source*	*Value*
GWP_{CH4}	$tCO_2e/ t CH_4$	Global warming potential of methane	IPCC Second Assessment Report [54]	21
ρ_{CH4}	t/m^3	Methane density	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 4: Fugitive Emissions, Page 4.12[55]. Value was converted from converted $Gg \cdot m^{-3}$ to t/m^3.IPCC default value under standard physical conditions (t=293,15 K; p=101,2325 kPa)	0.00067

[54] http://www.ipcc.ch/ipccreports/sar/wg_I/ipcc_sar_wg_I_full_report.pdf Page 22.
[55] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf

p_{WHB}	dimensionless unit	Correction factor, determining the probability of spontaneous combustion of the waste heap	Report on the fire risk of Lugansk Region's waste heaps, Scientific Research Institute "Respirator", Donetsk, 2012	0.78
$EF_{CH_4,CM}$	m^3/t	Fugitive methane emissions factor during coal mines operation	National Inventory Report of Ukraine 1990-2010, p. 90	25.67
$NCV_{Coal,y}$	TJ/kt	Net calorific value of coal in year *y*	National Inventory Report of Ukraine[56] 1990-2010 p. 456, 462, 468 (1.A.1.a – Public Electricity and Heat Production)	2008 – 21.5 2009 – 21.8 2010 – 21.6 2011 – 21.6 2012 – 21.6
$OXID_{Coal,y}$	ratio	Carbon oxidation factor of coal in year *y*	National Inventory Report of Ukraine 1990-2010 p. 459, 465, 471 (1.A.1.a – Public Electricity and Heat Production)	2008 – 0.963 2009 – 0.963 2010 – 0.962 2011 – 0.962 2012 – 0.962
$k^C_{Coal,y}$	t C/TJ	Carbon content of coal in year *y*	National Inventory Report of Ukraine 1990-2010 p. 458, 464, 470 (1.A.1.a – Public Electricity and Heat Production)	2008 – 25.95 2009 – 25.97 2010 – 25.99 2011 – 25.99 2012 – 25.99
$A_{coal,y}$	%	Average ash content of thermal coal extracted in Lugansk region, Ukraine	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine, Lugansk 2010 (see Annex 4). Indicators for thermal coal.	2008 – 37.20 2009 – 38.40 2010 – 38.10 2011 – 38.10 2012 – 38.10
$W_{coal,y}$	%	Average water content of thermal coal extracted in Lugansk region, Ukraine	Guide of quality, volume of coal production and enrichment products in 2008-2010, Ministry of Coal Industry of Ukraine, State Committee of Ukraine, Lugansk 2010 (see Annex 4). Indicators for thermal coal.	2008 – 7.2 2009 – 7.4 2010 – 7.4 2011 – 7.4 2012 – 7.4

[56] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5888.php

$N^{e}_{coal,y}$	MWh/t	Average consumption of electricity per tonne of extracted coal in Ukraine in year *y*	State Statistics Service of Ukraine. Fuel and energy resources of Ukraine, Statistical Yearbook, Kyiv 2009 (see Annex 5)	2008 – 0.0878 2009 – 0.0905 2010 – 0.0926 2011 - 0.0842 2012 – 0.0842
$NCV_{diesel,y}$	TJ/kt	Net calorific value of diesel fuel in year *y*	National Inventory Report of Ukraine 1990-2010 p. 473[57],476, 479 (value for mobile combustion, off-road transport)	2008 – 42.2 2009 – 42.3 2010 – 42.5 2011 – 42.5 2012 – 42.5
$OXID_{diesel,y}$	ratio	Carbon oxidation factor of diesel fuel in period *y*	National Inventory Report of Ukraine 1990-2010 p. 475, 478, 481 (value for mobile combustion, off-road transport)	2008 – 0.99 2009 – 0.99 2010 – 0.99 2011 – 0.99 2012 – 0.99
$k^{C}_{diesel,y}$	t C/TJ	Carbon content of diesel fuel in period *y*	National Inventory Report of Ukraine 1990-2010 p. 474, 477, 480 (value for mobile combustion, off-road transport)	2008 – 20.20 2009 – 20.20 2010 – 20.20 2011 – 20.20 2012 – 20.20
$EF_{grid,y}$	tCO_2/MWh	Specific indirect carbon dioxide emissions during the consumption of electric energy by the 2nd class electricity consumers according to Procedure for determining consumers' classes.	National Environmental Investment Agency Orders: No. 62 dated 15/04/2011 for 2008 No. 63 dated 15/04/2011 for 2009 No. 43 dated 28/03/2011 for 2010 No. 75 dated 12/05/2011 for 2011 (2012)	2008 – 1.219 2009 – 1.237 2010 – 1.225 2011 – 1.227 2012 – 1.227

The data and parameters that are not monitored throughout the crediting period but are determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination.

[57] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5888.php

All parameters taken for calculations of GHG emission reductions under the project, and sources of which are National Inventory Report of Ukraine 1990-2010, as well as data of State Statistics Service of Ukraine and DFP of Ukraine (SEIA) can be updated in case of publication of new relevant documents. If data for the current period are not available, the last available data are taken into calculation of GHG emission reductions.

The data and parameters that are monitored throughout the crediting period:

$EC_{PJ,y}$	Additional electricity consumed in period *y* as a result of the implementation of the project activity
$FC_{PJ,Diesel,y}$	Amount of diesel fuel consumed as a result of the project activity in period *y*
$FR_{Coal,y}$	Amount of sorted coal containing fraction (0-75mm), removed from the waste heap and separated from the rock as a result of project activity in period *y*.
$A_{rock,y}$	Average ash content of sorted fraction extracted from waste heap in year *y*
$W_{rock,y}$	Average water content of sorted fraction extracted from waste heap in year *y*

Setup of measurement installation

Measurement of certain parameters that are to be monitored in this project goes as follows:

1) Amount of electricity consumed in the project activity is measured using the special meter which is a multifunction device for measurement of electric energy. Electricity meter runs regular calibration in accordance with the internal regulations.
2) Amount of sorted fraction containing coal (0-75mm), extracted from the waste heap and separated from the rock is measured by special automobile scales. Control of functionality of automobile scales is performed personnel, mines and for calibration scales representatives of the State Metrology Service of Ukraine are involved.
3) Amount of diesel fuel burned as a result of activity will be supported by completion certificates from the contractor. This parameter comes from the accounting records of independent party.
4) Indicators of ash and water content of sorted coal fraction are determined by independent laboratory that analyzes samples of the extracted coal, and presents the results of the analysis in certificates of product quality. Buyer of coal products has free access to this information. Procedures for conducting studies meet the following regulations: ISO 4096-2002, GOST 27314-91, GOST11022-95 and others.

Measuring devices

All measuring devices operating within the project activity will undergo regular periodic calibration procedures according to the characteristics of their passport, and according to the rules of the Host Party. Appointed person will be responsible for controlling and serviceability of measuring devices (see Section D.3). Representatives of the State Metrologic System of Ukraine will be involved for calibration of measuring devices.

- To measure the consumed electricity multifunction electricity meter Actaris SL7000 Smart (type SL761) is used, which was calibrated and installed in Q4 2007. It takes into account all electricity consumed under the project activity. According to the passport data of the electricity meter Actaris SL7000 Smart (type SL761) calibration interval is 6 years.
- For weighing amount of coal sorted fraction delivered to the consumer, special automobile scales are used. For automobile scales of “RS-30C13A” type calibration interval is 1 year.

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 to be monitored and are necessary for verification must be kept for two years after the last transfer of ERUs within the project. If expected data for monitoring concerning the production of coal is not available (that is used for calculating baseline emissions and leakages), they will not be taken into account and emission reductions will not be included. If there are no data of parameters used to calculate project emissions: consumption of electricity or diesel fuel, average specific data on consumption for the previous periods will be used. This is a conservative.

Training of monitoring personnel

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. Thus, personnel, responsible for monitoring, will receive training on monitoring procedures and requirements.

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

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

The project host management of the company, where the project is implemented, has to 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. All communications will be delivered to the project host management who is required to review these communications and in case it is found appropriate implement necessary corrective actions and improvements. “REMSTROYPROEKT 2002” LLC will conduct periodic review of the monitoring plan and procedures and if necessary will make changes to improve control of certain indicators.

Procedures that will be implemented if expected data from any sources are not available

For data and parameters, monitoring of which is not made during the whole crediting period, and the values are determined only once (and remain unchanged during the whole crediting period) and are available or unavailable at the stage of determination of the PDD, the values indicated in the PDD are used. If updated data are not available, last publicly available actual values are used. If any data are not available for calculations GHG emissions data of the previous period are used.

For data and parameters, which are monitored during the whole crediting period, standard procedures in this sector for each data type are used. For example cross-checking with suppliers, receiving estimated values, averaging etc. In each case, changing the method of receiving data will be recorded and displayed in the monitoring report.

Emergency preparedness for cases where emergencies can cause unintended emissions

During operation of the project it is impossible to predict all factors and emergency situations that can cause unintended GHG emissions. Safe operation of equipment and personnel is ensured by systematic training on security. Procedures for dealing with general emergencies such as fire, major malfunctions etc. are developed as part of the mandatory business regulations and are in accordance with local requirements.

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

This section is left blank on purpose.

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
P-1	$EC_{PJ,y}$ - Additional electricity consumed as a result of the implementation of the project activity in the relevant period *y*	Acceptance certificates of consumed electricity. Indications of electricity meters	MWh	m/c	Monthly	100%	Electronic and paper	Data will be archived during two years after the last transfer of ERUs to the buyer
P-2	$FC_{PJ,Diesel,y}$ - Amount of diesel fuel burned as a result of the project activity in the relevant period *y*	Company records	t	c	Monthly	100%	Electronic and paper	Data will be archived during two years after the last transfer of ERUs to the buyer
P-3	$EF_{grid,y}$ - Specific indirect carbon dioxide emissions during the consumption of electric energy by the	See Section D.1.	tCO_2/MWh	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination,

	2nd class electricity for period *y*							verification
P-4	$NCV_{Diesel,y}$ - Net calorific value of diesel fuel in period *y*	National Inventory Report of Ukraine 1990-2010 (value for mobile combustion, off-road transport)	TJ/kt	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination, verification
P-5	$OXID_{Diesel,y}$ - Carbon oxidation factor of diesel fuel in period *y*	National Inventory Report of Ukraine (value for mobile combustion, off-road transport)	ratio	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination, verification
P-6	$k^{C}_{Diesel,y}$ - Carbon content of diesel fuel in period *y*	National Inventory Report of Ukraine (value for mobile combustion, off-road transport)	t C/TJ	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination, verification

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

Calculation results are presented in metric tons of carbon dioxide equivalent (tCO_2e), 1 metric ton of carbon dioxide equivalent is equal to 1 metric ton of carbon dioxide (CO_2), i.e. 1 tCO_2e = 1 tCO_2.

Project GHG emissions are calculated as follows:

$$PE_y = PE_{EL,y} + PE_{Diesel,y}, \qquad \textit{(Equation 8)},$$

where:

PE_y, - Project emissions due to project activity in period y, tCO_2e;

$PE_{EL,y}$ - Project emissions due to consumption of electricity from the grid by the project activity in period y, tCO_2e;

$PE_{Diesel,y}$ - Project emissions due to consumption of diesel fuel by the project activity in period y, tCO_2e.

Project emissions due to consumption of electricity from the grid by the project activity are calculated as follows:

$$PE_{EL,y} = EC_{PJ,y} \cdot EF_{grid,y}, \qquad \textit{(Equation 9)},$$

where:

$EC_{PJ,y}$ - Additional electricity consumed in period y as a result of the implementation of the project activity, MWh;

$EF_{grid,y}$ - Specific indirect carbon dioxide emissions during the consumption of electric energy by the 2nd class electricity consumers according to Procedure for determining consumers' classes, approved by Resolution of the National Electricity Regulatory Commission of Ukraine dated 13.08.1998 No. 1052, tCO_2/MWh.

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

$$PE_{Diesel,y} = \frac{FC_{PJ,Diesel,y}}{1000} \cdot NCV_{Diesel,y} \cdot OXID_{Diesel,y} \cdot k^{C}_{Diesel,y} \cdot 44/12, \qquad \textit{(Equation 10)},$$

where:

$FC_{PJ,Diesel,y}$ - Amount of diesel fuel consumed as a result of the project activity in period *y*, t;

$NCV_{Diesel,y}$ - Net calorific value of diesel fuel, TJ/kt;

$OXID_{Diesel,y}$ - Carbon oxidation factor of diesel fuel in period *y*, ratio;

$k^{C}_{Diesel,y}$ - Carbon content of diesel fuel in period *y*, t C/TJ;

$\frac{44}{12}$ - Ration between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2.

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
B-1	$FR_{Coal,y}$ - Amount of sorted coal containing fraction (0-75mm), removed from the waste heap and separated from the rock as a result of project activity in period *y*	Commercial data of the company. Weighing is implemented using automobile scales.	t	m/c	continuously	100%	Electronic and paper	Data will be archived during two years after the last transfer of ERUs to the buyer

B-2	$A_{rock,y}$ - Average ash content of beneficiated sorted fraction (0-75mm), extracted from the waste heap as a result of the project implementation in period *y*	Quality certificate of coal products	%	m/c	monthly	100%	Electronic and paper	Data will be archived during two years after the last transfer of ERUs to the buyer
B-3	$W_{rock,y}$ - Average water content of beneficiated sorted fraction (0-75mm), extracted from the waste heap as a result of the project implementation in period *y*	Quality certificate of coal products	%	m/c	monthly	100%	Electronic and paper	Data will be archived during two years after the last transfer of ERUs to the buyer
B-4	$FC_{BE,Coal,y}$ - Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation in period *y*, t	Is the result of the calculation under equation "3"	t	c	monthly	100%	Electronic and paper	Calculated under equation "3"in Section B.1.

B-5	$A_{coal,y}$ - Average ash content of thermal coal extracted in Lugansk region, Ukraine in period y	See Annex 4	%	e	Fixed ex-ante	100%	Electronic and paper	Statistical data Are available at the time of determination, verification data
B-6	$W_{coal,y}$ - Average ash content of thermal coal extracted in Lugansk region, Ukraine in period y	See Annex 4	%	e	Fixed ex-ante	100%	Electronic and paper	Statistical data Are available at the time of determination, verification data
B-7	$NCV_{Coal,y}$ - Net Calorific Value of coal in period *y*	National Inventory Report of Ukraine 1990-2010 (1.A.1.a – Public Electricity and Heat Production)	TJ/kt	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination, verification
B-8	$OXID_{Coal,y}$ - Carbon oxidation factor of coal in year *y*	National Inventory Report of Ukraine 1990-2010 (1.A.1.a – Public Electricity and Heat Production)	ratio	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination, verification

B-9	$k^{C}_{Coal,y}$ - Carbon content of coal in period *y*	National Inventory Report of Ukraine 1990-2010 (1.A.1.a – Public Electricity and Heat Production)	T C/TJ	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination, verification
B-10	p_{WHB} - Correction factor, determining the probability of spontaneous combustion of the waste heap	Report on the fire risk of Luhansk Region's waste heaps, Scientific Research Institute "Respirator", Donetsk, 2012	dimension less unit	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination, verification

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

Calculation results are presented in metric tons of carbon dioxide equivalent (tCO_2e), 1 metric ton of carbon dioxide equivalent is equal to 1 metric ton of carbon dioxide (CO_2), i.e. 1 tCO_2e = 1 tCO_2.

Baseline emissions are calculated as follows:

$$BE_y = BE_{WHB,y} \qquad \textit{(Equation 11)},$$

where*:*

BE_y, - Baseline emissions in period *y*, tCO_2e,

$BE_{WHB,y}$ - Baseline emissions related to waste heap burning in period *y*, tCO_2e.

Baseline emissions related to waste heaps combustion are in turn calculated as:

$$BE_{WHB} = \frac{FC_{BE,Coal,y}}{1000} \cdot p_{WHB} \cdot NCV_{Coal,y} \cdot OXID_{Coal,y} \cdot k^{C}_{Coal,y} \cdot 44/12,$$ *(Equation 12),*

where:

$FC_{BE,Coal,y}$ - Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation in period *y*, t;

ρ_{WHB} - Correction factor, determining the probability of spontaneous combustion of the waste heap, dimensionless unit;

$NCV_{Coal,y}$ - Net calorific value of coal in period *y*, TJ/kt;

$OXID_{Coal,y}$ - Carbon oxidation factor of coal in period *y*, ratio;

$k^{C}_{Coal,y}$ - Carbon content of coal in period *y*, tC/TJ;

$\frac{44}{12}$ - Ration between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2;

1/1000 - Physical transformation [t] in [kt] for calculation purposes.

Amount of coal that would be mined in the baseline scenario and burned for energy production is calculated by the formula:

$$FC_{BE,coal,y} = FR_{coal,y} \cdot \frac{\left(1 - \frac{A_{rock,y}}{100} - \frac{W_{rock,y}}{100}\right)}{\left(1 - \frac{A_{coal,y}}{100} - \frac{W_{coal,y}}{100}\right)}$$ *(Equation 13),*

where:

$FR_{coal,y}$ - Amount of sorted fraction containing coal (0-75mm), extracted from the waste heap and separated from the rock as a result of project activity in period *y;*

$A_{rock,y}$ - Average ash content of beneficiated sorted fraction (0-75mm), extracted from the waste heap as a result of the project implementation in period *y*,%;

$W_{rock,y}$ - Average water content of beneficiated sorted fraction (0-75mm), extracted from the waste heap as a result of the project implementation in period y,%;

$A_{coal,y}$ - Average ash content of thermal coal, extracted in Lugansk region of Ukraine in period y, %;

$W_{coal,y}$ - Average water content of thermal coal, extracted in Lugansk region of Ukraine in period y, %;

1/100 - Mathematical conversion to fraction, ratio.

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

This section is left blank on purpose.

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

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

This section is left blank on purpose.

D.1.2.2. Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

This section is left blank on purpose.

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

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). Also, the project takes into account other sources which are observed in the operation of coal mines, namely, electricity consumption from the grid of Ukraine. Coal mines consume large amounts of electricity, so these emissions should be considered.
This leakage is significant and will be included in the monitoring plan and calculation of the project emission reductions.

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
B-1	$FR_{Coal,y}$ - Amount of sorted fraction containing coal (0-75mm), extracted from the waste heap and separated from the rock as a result of project activity in period *y*	Commercial data of the company. Weighing is implemented using automobile scales.	t	m/c	continuously	100%	Electronic and paper	Data will be archived during two years after the last transfer of ERUs to the buyer
B-2	$FC_{BE,Coal,y}$ - Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result	Is the result of the calculation under equation “3”	t	c	monthly	100%	Electronic and paper	Calculated under equation “3”in Section B.1.

	of the project implementation in period *y*, t							
B-3	GWP_{CH4}- Global Warming Potential of Methane	See Section D.1.	tCO_2e/tCH_4	e	Fixed ex-ante	100%	Electronic and paper	Are available at the time of determination, verification data
B-4	$N^{e}_{coal,y}$ - Average electricity consumption per ton of coal, produced in Ukraine in period *y*	See Section D.1.	MWh/t	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination, verification
B-5	ρ_{CH4}– Methane density under standard conditions	See Section D.1.	t/m^3	e	Fixed ex-ante	100%	Electronic and paper	Are available at the time of determination, verification data
B-6	$EF_{CH_4,CM}$ - Fugitive methane emissions factor during coal mines operation in period *y*	See Section D.1.	m^3/t	e	Fixed ex-ante	100%	Electronic and paper	Last updated specific data available at the time of determination, verification

Parameters given in Sections D.1.1.1, D.1.1.2, D.1.3.1 , and are determined ex-ante, are collected by using publicly available sources, which are periodically updated. Such sources are National Inventory Report of Ukraine 1990-2010, and also IPCC Guidelines.

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

Leakages in period *y* are calculated as follows:

$$LE_y = LE_{CH_4,y} + LE_{EL,y} \quad \text{(Equation 14)},$$

where:

LE_y - Leakages as a result of the project implementation in period *y*, tCO_2e;

$LE_{CH_4,y}$ - Leakages related to fugitive emissions of methane during operation of mines in period *y*, tCO_2e;

$LE_{EL,y}$ - Leakages related to fugitive emissions of methane during operation of mines in period *y*, tCO_2e.

Leakages related to fugitive emissions of methane during operation of mines in period *y* are calculated as follows:

$$LE_{CH_4,y} = -FC_{BE,Coal,y} \cdot EF_{CH_4,CM} \cdot \rho_{CH_4} \cdot GWP_{CH_4} \quad \text{(Equation 15)},$$

where:

$FC_{BE,Coal,y}$ - Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation in period *y*, t;

$EF_{CH_4,CM}$ - Fugitive methane emissions factor during coal mining , m^3/t;

ρ_{CH4} - Methane density, t/m^3;

GWP_{CH4} - Global Warming Potential of Methane, tCO_2e/tCH_4.

Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation is calculated by the formula:

$$FC_{BE,coal,y} = FR_{coal,y} \cdot \frac{\left(1 - \frac{A_{rock,y}}{100} - \frac{W_{rock,y}}{100}\right)}{\left(1 - \frac{A_{coal,y}}{100} - \frac{W_{coal,y}}{100}\right)}$$ *(Equation 16),*

where:

$FR_{coal,y}$	-	Amount of sorted fraction containing coal (0-75mm), extracted from the waste heap and separated from the rock as a result of project activity in period *y;*
$A_{rock,y}$	-	Average ash content of beneficiated sorted fraction (0-75mm) extracted from the waste heaps as a result of the project implementation in period *y*, %;
$W_{rock,y}$	-	Average water content of beneficiated sorted fraction (0-75mm) extracted from the waste heaps as a result of the project implementation in period *y*,%;
$A_{coal,y}$	-	Average ash content of thermal coal, extracted in Lugansk region of Ukraine in period *y*, %;
$W_{coal,y}$	-	Average water content of thermal coal, extracted in Lugansk region of Ukraine in period *y*, %;
1/100	-	Mathematical conversion to fraction, ratio.

Leakages related to electricity consumption from energy grid during coal mining in period *y* are calculated as follows:

$$LE_{EL,y} = -FC_{BE,Coal,y} \cdot N^{e}_{coal,y} \cdot EF_{grid,y}$$ *(Equation 17),*

where:

$FC_{BE,coal,y}$	-	Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation in period *y*, t;
$N^{E}_{coal,y}$	-	Average electricity consumption per ton of coal, produced in Ukraine in period *y*, MWh/t Average electricity consumption per ton of coal, produced in Ukraine in period *y*, MWh/t;
$EF_{grid,y}$	-	Specific indirect carbon dioxide emissions during the consumption of electric energy by the 2nd class electricity consumers in period

y, t CO_2/MWh.

D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

Annual emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$ *(Equation 18)*,

where:

ER_y – Emission reductions as a result of the project implementation in period *y*, tCO_2e;

BE_y – Emissions in baseline scenario in period *y*, tCO_2e;

PE_y – Project emissions as a result of the project implementation in period *y*, tCO_2e;

LE_y – Leakages as a result of the project implementation in period *y*, tCO_2e.

D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project:

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 (EIA) for Designing and Construction of Production Facilities, Buildings and Structures"* 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.
D.1.1.1. – P-1	Low	The electricity meters are calibrated according to the procedures of the Host Party. Calibration interval is 6 years.
D.1.1.1. – P-2	Low	These data come from the contractor in the form of certificates of completion. Data are archived in paper and electronic form.
D.1.1.3. – B-1	Low	This data is used in the commercial activity of the company. This parameter is determined

		by weighing the goods on special automobile scales that are calibrated according to the procedures of the Host Party. Calibration interval is 1 year.
D.1.1.3. – B-2	Low	This data is used in the commercial activity of the company. Laboratory studies
D.1.1.3. – B-3	Low	This data is used in the commercial activity of the company. Laboratory studies
D.1.3.1. – B-1	Low	This parameter is used in the commercial activity of the company. This parameter is determined by weighing the goods on special automobile scales that are calibrated according to the procedures of the Host Party. Calibration interval is 1 year.

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

The project owner, which will implement the provisions of this monitoring plan in the structure of organization and quality management, is "REMSTROYPROEKT 2002" LLC. Management headed by the director of the enterprise is responsible for the implementation of monitoring, data collection, registration, visualization, storage and reporting of data that were monitored and periodic verifications of measuring devices. Detailed structure of the administrative board of the company will be established in Monitoring report before the primary and the first verification. The basic structure is demonstrated by the following block diagram:

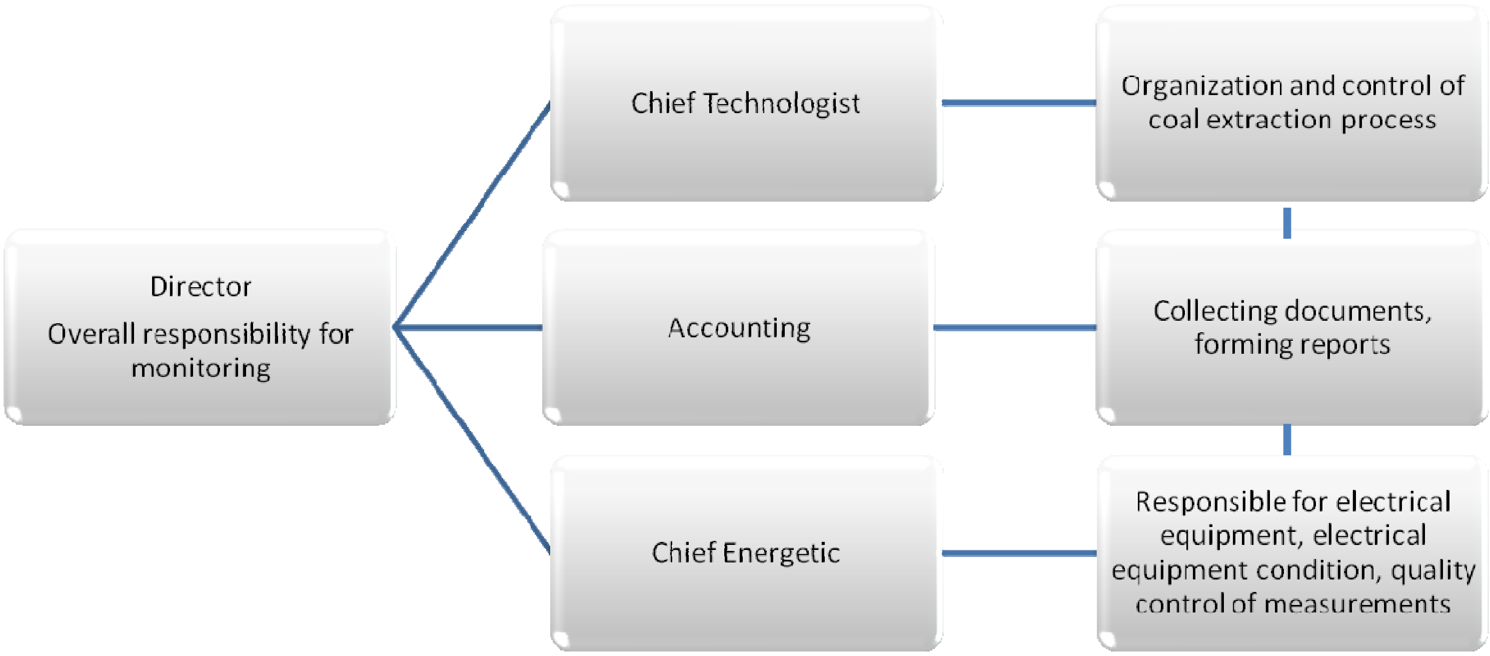

Figure 11 – Block diagram of monitoring.

The company has the following management scheme:

- Director of "REMSTROYPROEKT 2002" LLC is the main figure in management structure of the enterprise. He is responsible for the accuracy and reliability of all monitoring indicators, provides cross checks of certain parameters used for calculation of GHG emission reductions. Strategy of development and planning of the project depends on his direct actions.
- Chief Technologist is responsible for the technological operating modes of the project equipment, for safety at work, and he takes the decision to perform repair and maintenance work on complex for processing rock mass of the waste heap. He sends data on the volume of shipped coal products to the accounting department.

- Chief Energetic is responsible for providing electricity to the industrial area, and is also responsible for the timely involving representatives of State Metrology Service for calibration of the measuring device. He fixes all changes in electrical equipment and passes them to the accounting department.
- Accounting department is responsible for collecting, archiving, visualization of raw data on the consumption of diesel fuel and electricity consumption as well as the volume of shipped coal products. Accounting serves as a buffer between the industrial site and Director of the enterprise. This department is also responsible for conducting periodic studies of samples of coal extracted from the waste heap as a result of project activity. It generates monthly and annual technical reports and submits them to the Director of "REMSTROYPROEKT 2002" LLC.

D.4. Name of persons/entities establishing the monitoring plan:

"REMSTROYPROEKT 2002" LLC is the owner of emission sources and developer of project design document. All sections of this PDD were developed "REMSTROYPROEKT 2002" LLC. "REMSTROYPROEKT 2002" LLC is a project participant.

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

The formulas used to estimate the project anthropogenic emissions by sources of greenhouse gas emissions, description of calculations by these formulas and all the assumptions used are described in Section D.1.1.2.

Table 15 – Estimated project emissions during the crediting period for 2008-2012

Project emission	Unit	2008	2009	2010	2011	2012	Total
Project emissions due to consumption of electricity from the grid as a result of the project activity in period *y*	tCO_2e	1 888	2 103	2 414	2 006	2 040	**10 451**
Project emissions due to consumption of diesel fuel as a result of the project activity in period *y*	tCO_2e	369	405	454	384	392	**2 015**
Total project emissions over the crediting period	tCO_2e	2 257	2 508	2 868	2 390	2 432	**12 455**

Table 16 – Estimated project emissions after the crediting period for 2013-2015

Project emission estimated for 2013-2015	Unit	Annual emissions	Total
Project emissions due to consumption of electricity from the grid as a result of the project activity in period *y*	tCO_2e	2 090	**6 270**
Project emissions due to consumption of diesel fuel as a result of the project activity in period *y*	tCO_2e	401	**1 203**
Total project emissions after the crediting period	tCO_2e	2 491	**7 473**

E.2. Estimated leakage:

The formulas used to estimate the leakage under the project activities, description of calculations by these formulas and all the assumptions used are described in Section D.1.3.

Table 17 – Estimated leakages during the crediting period for 2008-2012

Leakages	Unit	2008	2009	2010	2011	2012	Total
Leakages due to fugitive emissions of methane in the mining activities in the period *y*	tCO_2e	-52 607	-59 373	-65 288	-56 435	-57 906	**-291 609**
Leakages as a result of electricity consumption during coal mining in period *y*	tCO_2e	-15 589	-18 403	-20 505	-16 143	-16 564	**-87 204**

Total leakages during the crediting period	tCO_2e	-68 196	-77 776	-85 793	-72 578	-74 470	**-378 813**

Table 18 – Estimated leakages after the crediting period for 2013-2015

Leakages estimated for 2013-2015	Unit	Values of annual GHG emissions	Total
Leakages due to fugitive emissions of methane in the mining activities in period *y*	tCO_2e	-58 791	**-176 373**
Leakages as a result of electricity consumption during coal mining in period *y*	tCO_2e	-16 817	**-50 451**
Total leakages after the crediting period	tCO_2e	-75 608	**-226 824**

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

Table 19 – Estimated total emissions as a result of the project activity during the crediting period for 2008-2012

Parameter	Unit	2008	2009	2010	2011	2012	Total
Total project emissions during the crediting period	tCO_2e	-65 939	-75 268	-82 925	-70 188	-72 038	**-366 358**

Table 20 – Estimated total project emissions after crediting period for 2013-2015

Parameter	Unit	Values of annual GHG emissions	Total
Total project emissions after the crediting period	tCO_2e	73 117	**219 351**

E.4. Estimated baseline emissions:

Table 21 – Estimated baseline emissions during the crediting period for 2008-2012

Baseline emissions	Unit	2008	2009	2010	2011	2012	Total
Baseline emissions due to burning of the waste heap in period *y*	tCO_2e	223 817	256 323	279 198	241 339	247 630	**1 248 307**
Total baseline emissions over the crediting period	tCO_2e	223 817	256 323	279 198	241 339	247 630	**1 248 307**

Table 22 – Estimated baseline emissions after the crediting period for 2013-2015

Baseline emissions estimated for 2013-2015	Unit	Values of annual GHG emissions	Total

Total baseline emissions after the crediting period related to burning of the waste heap in period y	tCO_2e	251 415	**754 245**

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

Table 23 – Estimated emission reductions during the crediting period for 2008-2012

Parameter	Unit	2008	2009	2010	2011	2012	Total
Emission reductions during the crediting period	tCO_2e	289 756	331 591	362 123	311 527	319 668	**1 614 665**

Table 24 – Estimated emission reductions after the crediting period for 2013-2015

Emission reductions estimated for 2013-2015	Unit	Values of annual GHG emissions	Total
Emission reductions after the crediting period	tCO_2e	324 532	**973 596**

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

Table 25 – Estimated balance of emissions under the proposed project over the crediting period

Year	Estimated Project Emissions (tonnes CO_2 equivalent)	Estimated Leakage (tonnes CO_2 equivalent)	Estimated Baseline Emissions (tonnes CO_2 equivalent)	Estimated Emissions Reductions (tonnes CO_2 equivalent)
2008	2 257	-68 196	223 817	289 756
2009	2 508	-77 776	256 323	331 591
2010	2 868	-85 793	279 198	362 123
2011	2 390	-72 578	241 339	311 527
2012	2 432	-74 470	247 630	319 668
Total (tonnes CO_2 equivalent)	12 455	-378 813	1 248 307	1 614 665

Table 26 – Estimated balance of emissions under the proposed project after the crediting period

Year	Estimated Project Emissions (tonnes CO_2 equivalent)	Estimated Leakage (tonnes CO_2 equivalent)	Estimated Baseline Emissions (tonnes CO_2 equivalent)	Estimated Emissions Reductions (tonnes CO_2 equivalent)
2013	2 491	-75 608	251 415	324 532
2014	2 491	-75 608	251 415	324 532
2015	2 491	-75 608	251 415	324 532
Total (tonnes CO_2 equivalent)	7 473	-226 824	754 245	973 596

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts of the project, including transboundary impacts, in accordance with procedures as determined by the Host Party:

The 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.-1-2003[58] (Title: "Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures").

In Annex F of this standard there is a list of "types of projects or activities that are of high environmental hazard" for which full-scale EIA is obligatory, Ministry of Environment and Natural Resources of Ukraine is competent authority for performing of it. Project activities that consist of utilization of wastes of coal industry and of coal production are included in this list.

Comprehensive EIA according to the legislation of Ukraine was performed for the proposed project. Here are some general conclusions of this EIA:

- There is no impact on the water. Project activity of the point for processing of rock mass will not affect the superficial and underground (ground) water because there are no sources of such pollution. Project equipment and beneficiation technology of rock mass excludes the use of water. Water used for household needs on-site, is delivered by tank truck;
- Impact on atmospheric air: according to the proposed activity of the point of processing rock mass into the atmospheric air dust coal and inorganic dust are emitted containing SiO_2 70-20%. According to the results of calculation of scattering it was determined that on the edge of sanitary protective zone point of processing bulk materials and on the boundary of the nearest residential area pollution of the surface of atmospheric layer by these types of dust as well as total dust including background air pollution do not exceed the maximum permissible concentration;
- There is no impact on flora and fauna. Planned activity of the point for processing bulk materials will not lead to depletion and degradation of plant groups and fauna of surrounding area, to their accumulation of harmful substances;
- Noise impact is limited. The main source of noise will be at the minimum desired distance from residential areas, mobile sources as for noise (traffic) provisions of local standards will be met;
- Impact on depths;
- Impact on landscapes: there is no impact as site of construction is located in industrial zone;
- Impact on society: the project activity does not render negative impact on public health because in the area of nearest residential buildings the level of pollution of surface layer of the atmosphere by project emissions is lower than the maximum permissible concentration, sound pressure level is lower that acceptable standards, there are no other sources of influence. All necessary measures are provided by working project, they are directed to protecting of staff from possible negative impact in accordance with sanitary standards.

[58] *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"* State Committee Of Ukraine On Construction And Architecture, 2004

- There are no transboundary effects. There are no impacts which occur on the territory of any other country, and which are caused by the implementation of this project that is physically located entirely within 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:

Comprehensive EIA was performed in 2007 by PE PB "Ekoservice". This study was focused on the impact of waste heaps dismantling on the environment. Conclusions of the report are above in section F.1. Project impact on the environment is not significant and harmful. According to Ukrainian laws and regulations, preparation of reports from Environmental Impact Assessment and positive conclusions of State Department of Ecology and Natural Resources makes procedure of environmental impact assessment.

SECTION G. Stakeholders' comments

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

No stakeholder consultation process for the JI projects is required by the Host Party. Stakeholder comments will be collected during the time of this PDD publication in the internet during the determination procedure. As a part of EIA, stakeholders must be informed via mass media about the proposed project as provided in *State construction standards of Ukraine DBN A.2.2.-1-2003: "Structure and Contents of the Environmental Impact Assessment (EIA) materials during design and construction of enterprises, buildings and structures"* issued by State Committee of Construction and Architecture in 2004. In accordance with the mentioned regulations, the relevant information was published in the local newspaper "Vostochniy Express" (Sverdlovsk) # 45 (482) dated September 1, 2007 and No. 49 (486) dated September 29, 2007. No comments were received.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Annex 2

BASELINE INFORMATION

Description of parameters included in the baseline

#	Parameter	Unit	Data source
1	$FC_{BE,Coal,y}$ - Amount of coal, mined in the baseline scenario and burned for energy production, equivalent to the amount of coal, extracted from the waste heaps as a result of the project implementation in period *y*, t;	t	Calculated according to the equation (3), Section B.1. Documents of the project owner
2	$FR_{Coal,y}$ - Amount of sorted coal containing fraction (0-75mm), removed from the waste heap and separated from the rock as a result of project activity in period *y*.	t	Documents of the project owner
3	$A_{rock,y}$ - Average ash content of sorted fraction (0-75mm), extracted from the waste heap in period *y*	%	Documents of the project owner. Laboratory study
4	$W_{sort,y}$ - Average water content of sorted fraction (0-75mm), extracted from the waste heap as a result of the project activity in period *y*	%	Documents of the project owner. Laboratory study
5	$A_{coal,y}$ - Average ash content of thermal coal extracted in Lugansk region, Ukraine in period y	%	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)
6	$W_{coal,y}$ – Average water content of thermal coal extracted in Lugansk region, Ukraine in period y	%	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)
7	$EF_{CH_4,CM}$ - Fugitive methane emissions factor during coal mines operation	m^3/t	National Inventory Report of Ukraine 1990-2009 p. 90
8	p_{WHB} - Correction factor, determining the probability of spontaneous combustion of the waste heap	dimensionless unit	Report on the fire risk of Lugansk Region’s waste heaps, Scientific Research Institute “Respirator”, Donetsk, 2012

9	GWP_{CH4} - Global Warming Potential of Methane	tCO_2e/tCH_4	IPCC Second Assessment Report
10	ρ_{CH4} - Methane density	т/м^3	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 4: Fugitive Emissions, Page 4.12. Value was converted from converted $Gg \cdot m^{-3}$ to t/m^3. IPCC default value under standard physical conditions (t=293,15 K; p=101,2325 kPa)
11	$NCV_{Coal,y}$ - Net Calorific Value of coal in period *y*	TJ/kt	National Inventory Report of Ukraine 1990-2010
12	$OXID_{Coal,y}$ - Carbon Oxidation factor of coal in period *y*	ratio	National Inventory Report of Ukraine 1990-2010
13	$k^{C}_{Coal,y}$ - Carbon content of coal in period *y*	tC/TJ	National Inventory Report of Ukraine 1990-2010
14	$N^{e}_{coal,y}$ - Average electricity consumption per ton of coal, produced in Ukraine in period *y*	MWh/t	State Statistics Service of Ukraine. Fuel and energy resources of Ukraine, Statistical Yearbook, Kyiv 2009, State Statistics Service of Ukraine. Fuel and energy resources of Ukraine, Statistical Yearbook, Kyiv 2011. See also Annex 5
15	$EF_{grid,y}$ - Specific indirect carbon dioxide emissions during the consumption of electric energy by the 2nd class electricity consumers according to Procedure for determining consumers' classes, approved by Resolution of the National Electricity Regulatory Commission of Ukraine dated 13.08.1998 # 1052	tCO_2/MWh	National Environmental Investment Agency Orders: No.62 dated 15/04/2011 p.[59], 2008 – 1.219 No.63 dated 15/04/2011 p.[60] 2009 – 1.237 No.43 dated 28/03/2011 p.[61] 2010 – 1.225 No.75 dated 12/05/2011p.[62] (2011 – 1.227; 2012 – 1.227 – the latest country-specific data) SEIA presents actual data of factor of indirect CO_2 emissions on an annual basis until March 1. If data are not available at the time of determination or verification, for GHG calculation value for the previous year is used.

[59] http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[60] http://www.neia.gov.ua/nature/doccatalog/document?id=127172
[61] http://www.neia.gov.ua/nature/doccatalog/document?id=126006
[62] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

Annex 3

MONITORING PLAN

Monitoring plan is described in Section D of this PDD.

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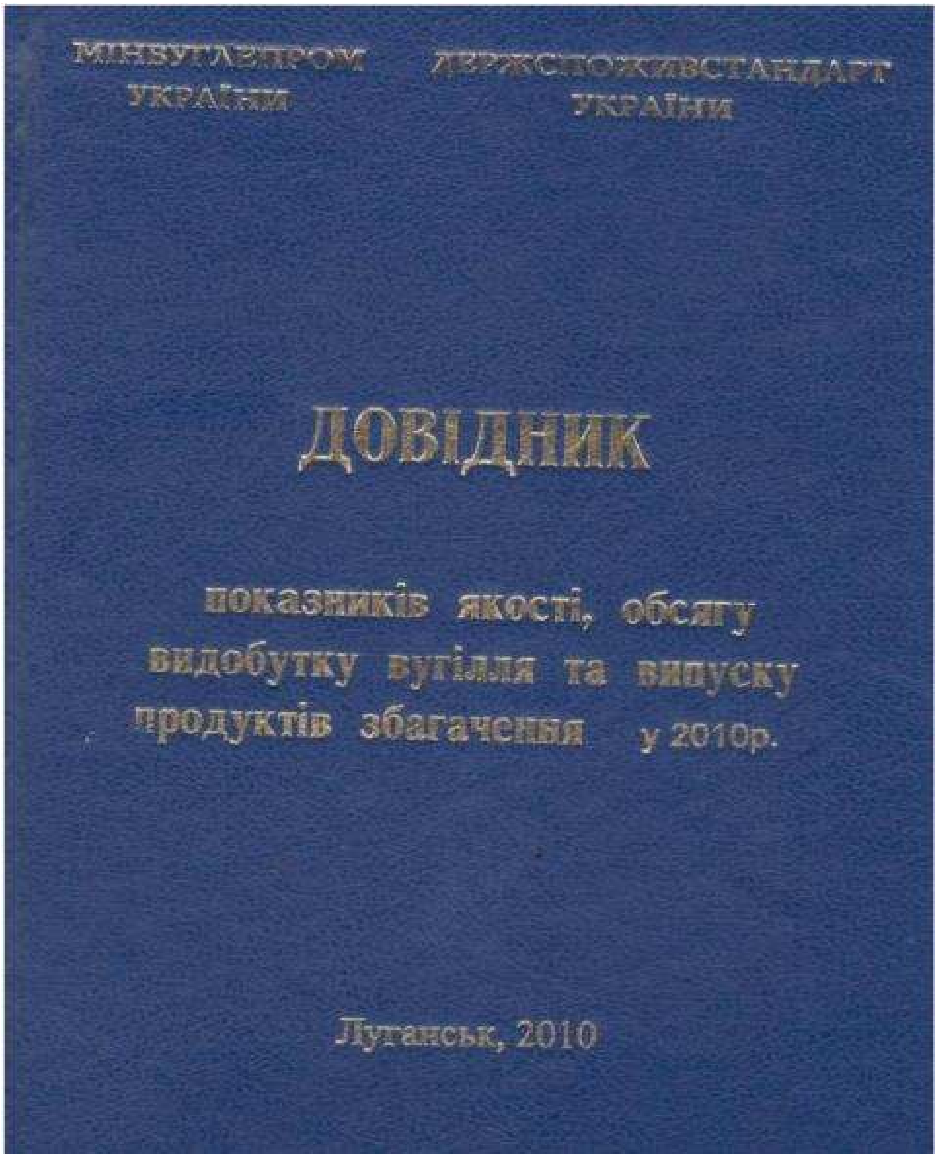
Annex 4

EXTRACTS FROM THE "REFERENCE BOOK OF QUALITY INDICATORS, VOLUME OF COAL PRODUCTION AND BENEFICIATION PRODUCTS IN 2008-2010"[63]



[63] http://ji.unfccc.int/UserManagement/FileStorage/NMPXTGSA7E4C095DHRJYUWLOI8Z3V1

Table 27 – Coal extraction in mines and stripe mines 2010

Найменування шахти	Долькова участь пласта у видобутку вугілля по шахті у 2010 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток рядового вугілля у 2009 році		Видобуток рядового вугілля, що планується у 2010 році				Класифікаційні параметри			
		кокс.	енерг.	тис. т	Зольність A^d, %	тис. т	Зольність A^d, %	Сірка S^d_t, %	Вологість W^r_t, %	Середній показник відбиття вітриніту R_o, %	Товщина пластичного шару Y, мм	Вихід летких речовин на сухий стан V^{daf}, %	Вища теплота згоряння Q_s^{daf}, ккал/кг
МІНВУГЛЕПРОМ УКРАЇНИ				72522,5	38,6	76204,5	38,9	2,0	7,7	-	-	26,5	8166
у тому числі:													
енергетичне вугілля				50458,0	39,2	52135,8	38,9	2,0	8,2	-	-	24,5	8028
			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
коксівне вугілля				22064,5	37,2	24068,7	39,0	2,1	6,7	-	-	30,9	8470
		ДГ		567,4	32,8	53,3	33,2	1,2	10,2	0,61	9	39,6	8210
		Г		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	Долькова участь пласта у видобутку вугілля по шахті у 2010 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток рядового вугілля у 2009 році		Видобуток рядового вугілля, що планується у 2010 році				Класифікаційні параметри			
		кокс.	енерг.	тис. т	Зольність A^d, %	тис. т	Зольність A^d, %	Сірка S^d_t, %	Вологість W^r_t, %	Середній показник відбиття вітриніту R_o, %	Товщина пластичного шару Y, мм	Вихід летких речовин на сухий стан V^{daf}, %	Вища теплота згоряння Q_s^{daf}, ккал/кг
Підпорядковані Мінвуглепрому				38398,5	39,6	39964,0	39,7	2,1	7,1	-	-	21,0	8193
у тому числі:													
енергетичне вугілля				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
коксівне вугілля				7130,5	37,8	6895,0	38,5	2,5	6,7	-	-	28,2	8513
		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
Непідпорядковані Мінвуглепрому				34127,0	37,4	37138,5	38,1	1,9	8,3	-	-	32,4	8136
у тому числі:													
енергетичне вугілля				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	4994,3	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
коксівне вугілля				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 пластів у видобутку вугілля по шахті у 2010 році, %	Марка вугілля ДСТУ 3472-96: кокс.	Марка вугілля ДСТУ 3472-96: енерг.	Фактичний видобуток рядового вугілля у 2009 році: тис. т	Фактичний видобуток рядового вугілля у 2009 році: Зольність A^d, %	Видобуток рядового вугілля, що планується у 2010 році: тис. т	Видобуток рядового вугілля, що планується у 2010 році: Зольність A^d, %	Сірка S^d_t, %	Волога W^r_t, %	Класифікаційні параметри: Середній показник відбиття вітриніту R_o, %	Товщина пластичного шару Y, мм	Вихід летких речовин на сухий стан V^{daf}, %	Вища теплота згорання Q_s^{daf}, ккал/кг
Донецька область				32159,6	38,1	32038,5	38,3	2,2	6,9	-	-	25,6	8389
у тому числі:													
Підпорядковані Мінвуглепрому				17919,6	40,0	18344,0	39,9	2,4	7,1	-	-	27,6	8307
Непідпорядковані Мінвуглепрому				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	9	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
Луганська область				23401,7	38,8	25802,0	39,3	2,1	6,9	-	-	17,6	7873
у тому числі:													
Підпорядковані Мінвуглепрому України				17246,7	38,3	17502,0	38,4	1,9	7,3	-	-	11,1	8062
Непідпорядковані Мінвуглепрому України				6155,0	40,4	8300,0	41,1	2,5	6,0	-	-	31,3	7473

Найменування шахти	Дольова участь пластів у видобутку вугілля по шахті у 2010 році, %	Марка вугілля ДСТУ 3472-96: кокс.	Марка вугілля ДСТУ 3472-96: енерг.	Фактичний видобуток рядового вугілля у 2009 році: тис. т	Фактичний видобуток рядового вугілля у 2009 році: Зольність A^d, %	Видобуток рядового вугілля, що планується у 2010 році: тис. т	Видобуток рядового вугілля, що планується у 2010 році: Зольність A^d, %	Сірка S^d_t, %	Волога W^r_t, %	Класифікаційні параметри: Середній показник відбиття вітриніту R_o, %	Товщина пластичного шару Y, мм	Вихід летких речовин на сухий стан V^{daf}, %	Вища теплота згорання Q_s^{daf}, 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	5690
			П	731,3	36,7	845,0	36,7	3,3	6,7	2,36	0	9,0	8531
			А	13669,5	37,1	13290,0	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	5,1	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
Дніпропетровська область				13732,0	38,0	15144,0	38,2	1,6	11,2	-	-	41,5	8171
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
Волинська область													
енергетичне вугілля			ДГ	476,0	38,2	590,0	37,2	2,1	9,3	0,64	7	37,1	7857
Львівська область													
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 28 – Coal extraction in mines and stripe mines 2008

І ВИДОБУТОК ВУГІЛЛЯ ШАХТАМИ ТА РОЗРІЗАМИ

Найменування шахти	Дольова участь пластів у видобутку вугілля по шахті у 2007 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток рядового вугілля у 2007 році		Видобуток рядового вугілля, що планується у 2008 році				Класифікаційні параметри			
		конс.	енерг.	тис. т	Зольність A^d, %	тис. т	Зольність A^d, %	Сірка S^d_t, %	Волога W^r_t, %	Середній показник відбиття вітриніту R_o, %	Товщина пластичного шару y, мм	Вихід летких речовин на сухий беззольний стан V^{daf}, %	Вища теплота згоряння Q_s^{daf}, ккал/кг
МІНВУГЛЕПРОМ УКРАЇНИ				75095,4	38,1	78343,6	38,4	2,1	8,0	-	-	28,1	8243
у тому числі													
Підпорядковані Мінвуглепрому				42152,3	40,1	46000,0	39,2	2,2	7,1	-	-	24,0	8195
Непідпорядковані Мінвуглепрому				32943,1	38,5	32343,6	37,2	2,1	9,4	-	-	33,9	8311
у тому числі													
енергетичне вугілля				49145,3	39,0	53103,0	36,6	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	34,5	3,8	55,6	0,35	0	60,6	6999
коксівне вугілля				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		11878,0	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	880,0	36,3	3,0	6,8	1,65	10	20,0	8613

Найменування шахти	Дольова участь пластів у видобутку вугілля по шахті у 2007 році, %	Марка вугілля ДСТУ 3472-96		Фактичний видобуток рядового вугілля у 2007 році		Видобуток рядового вугілля, що планується у 2008 році				Класифікаційні параметри			
		конс.	енерг.	тис. т	Зольність A^d, %	тис. т	Зольність A^d, %	Сірка S^d_t, %	Волога W^r_t, %	Середній показник відбиття вітриніту R_o, %	Товщина пластичного шару y, мм	Вихід летких речовин на сухий беззольний стан V^{daf}, %	Вища теплота згоряння Q_s^{daf}, ккал/кг
Донецька область				33790,3	38,6	34598,6	38,2	2,3	7,0	-	-	28,5	8341
у тому числі													
Підпорядковані Мінвуглепрому				19249,1	42,1	22270,0	39,8	2,4	7,1	-	-	31,1	8292
Непідпорядковані Мінвуглепрому				14541,2	34,1	12328,6	35,3	2,1	6,8	-	-	24,0	8430
у тому числі													
енергетичне вугілля				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	3058,3	48,5	2265,0	41,9	2,3	8,9	0,69	8	41,6	7950
			Г	5758,2	41,7	7768,0	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
коксівне вугілля				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
Луганська область				25208,7	36,7	27075,0	37,7	2,1	6,8	-	-	18,6	8192
у тому числі													
Підпорядковані Мінвуглепрому України				19387,6	37,1	20185,0	37,2	1,9	7,2	-	-	13,7	8075
Непідпорядковані Мінвуглепрому України				5821,1	35,0	6890,0	39,3	2,6	5,5	-	-	33,1	8531

Annex 5

REFERENCE OF THE STATE STATISTICS SERVICE OF UKRAINE "ACTUAL EXPENSES OF ELECTRICITY FOR PRODUCTION OF ONE TON OF NON-AGGLOMERATED COAL"[64]

ДЕРЖАВНА СЛУЖБА СТАТИСТИКИ УКРАЇНИ
(Держстат України)

вул. Шота Руставелі, 3, м. Київ, 01601
тел. (044) 287-24-22, факс (044) 235-37-39, телетайп 132-168, E-mail: office@ukrstat.gov.ua,
www.ukrstat.gov.ua

29.05.2012р. № 15/1-20/691 ПІ 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

Вик. Смалина В.П.,
тел 287-36-81

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[64] http://ji.unfccc.int/UserManagement/FileStorage/NMPXTGSA7E4C095DHRJYUWLOI8Z3V1