JOINT IMPLEMENTATION PROJECT

"REDUCTION OF GREENHOUSE GAS EMISSIONS BY MODERNIZING PRODUCTION TECHNOLOGY OF ASH AT PJSC "BELOTSERKOVSKIY PRECAST PLANT"

(project name)

Position of the head
of organization – document developer

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Position of the manager
of the business – emission source owner where the joint implementation project is planned to be realized

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Kyiv, November, 2012

JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM
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SECTION A. General description of the project

A.1. Title of the project:

"Reduction of greenhouse gas emissions by modernizing production technology of ash at PJSC "Belotserkovskiy precast plant"

The sectoral scope: 4 – Manufacturing industries

The version number of the document: 2.0

The date of the document: 5th of November 2012

A.2. Description of the project:

The proposed project is aimed at modernization of technological process of producing ash from flotation sludge for reinforced concrete production needs at PJSC "Belotserkovskiy precast plant" in Bila Tserkva, Kyiv Region, Ukraine with the purpose of preventing greenhouse gases emissions into the atmosphere as the result of natural gas consumption and combustion of coal component in the coal sludge which is the main raw material for ash production.

Situation before the beginning of the proposed project activity

PJSC "Belotserkovskiy precast plant" main field of business is the production of reinforced concrete and concrete products. The key products manufactured by the plant are reinforced concrete risers for electricity networks, trolley lines and railways. The plant also outputs other reinforced concrete products for construction (ceiling panels, trays, and jumpers), external engineering networks (ring of wells with lids and bottoms, concrete block of wall basements), ready-mixed concrete and roads covering.

For production of reinforced concrete products the plant uses ash that is grinded to a very small fraction with acceptable water and carbon content. Traditional scheme of obtaining suitable ash includes high-temperature drying of coal sludge and ball mills for grinding of the dry sludge. Resulting ash will be used further for production of reinforced concrete constructions and other purposes. Coal sludge, as a rule, is a dust of size 0 – 0.5 mm in original coal which comes to mud settling pits from coal-preparation plants in the process of coal grinding during transportation by inner plant transport and coal attrition in separators (on screens, grinders, jigs, separators, centrifuges, etc.). It contains carbon products of size less than 0.5 mm. The sludge mainly comes as suspension (hard particles in water) and rarely as plastic and friable (hard) mixture. The coal sludge is supplied to the plant through the railroad transport network from a number of suppliers located primarily in the Donetsk and Lugansk regions of Ukraine. Hard dryer's aim is to remove water from coal sludge for its further grinding in ball mills to fraction of 60 microns. For water removal natural gas is supplied to the dryer. During combustion of natural gas excessive water is exhaled as steam. During drying process coal that is contained in sludge gets oxidized producing at this additional amount of heat and greenhouse gases into the atmosphere. Dry sludge mass comes to ball mills to be grind to a fraction of defined class. After grinding process ash is dumped into bunker of ash storage. Laboratory chemical analysis of the produced ash is performed as needed to control the quality of the production process and per customer request if the ash is supplied to external consumers.

Thus the traditional technology of ash production requires substantial amount of natural gas and electric power for production. Combustion of natural gas and coal during high-temperature drying of sludge with the use of electric power for dryer's and ball mill's needs leads to emission of large amount of greenhouse gases into the atmosphere.

Baseline scenario:

The baseline scenario of the proposed project provides that the dry method of ash production with the use of high-temperature dryers and ball mills during coal sludge processing will be preserved. This implies continuation of natural gas combustion and use of electric power from the grid which leads to significant greenhouse gases emissions into the atmosphere.

Project scenario:

The project scenario provides for implementation and exploitation of the following equipment at the industrial site of the Belotserkovskiy precast plant:

- Rotating induction element LYV-300-AYN-36;
- Frequency converter INVT Electronics CHF100A-350G-4.

According to the project, implementation of full cycle of ash production from coal sludge by wet grinding technology is planned. According to the project the flotation sludge processing complex processes up to 756 thousand tons of sludge for own needs for production of reinforced concrete products and external consumers. Due to use of technology of wet method of ash production which is proposed in this project flotation sludge from mud settling pit is not dried and natural gas is not combusted for ash production of necessary fraction and better quality for further use. Coal oxidation does not occur as sludge contains not more than 3% of carbon. This transition will ensure the reduction of greenhouse gases (GHG) into the atmosphere, and:

- will reduce soil erosion and pollution of groundwater;
- will increase quality of output products;
- will reduce cost of the final product;
- will reduce water use in production;
- will reduce atmosphere air moistening by steam with harmful contaminants;
- will reduce the use of cement in production of reinforced concrete constructions.

Emissions reduction as the result of this project realization will come from three main sources:

- Removal of sources of greenhouse gases emissions resulting from high-temperature drying with natural gas combustion;
- Removal of sources of greenhouse gases emissions during carbon oxidation during high-temperature sludge drying;

History of the project

For achieving the project aim the development of the project documentation for modernization of ash production technology was initiated in 2007. Construction started in the second half of 2007 with improvement of production premises and preparation of the site. At the end of 2007 installation of the main production equipment was performed.

As the given project leads to the reduction of greenhouse gases emissions into the atmosphere, such reduction was certainly taken into account during making decision as for project realization. Emission reductions will be sold as ERUs in the international emission trading market and the obtained funds will improve financial indexes of the project up to the level which justifies means and funds used for its realization. From the very beginning the mechanism of joint implementation was one of the determinant project factors and financial advantages within the given mechanism play an important role in making decision as for beginning of functioning and are considered to be among reasons for project realization.

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)	• PJSC "Belotserkovskiy precast plant"	No
The Netherlands	• Amster Capital SCS	No

Amster Capital SCS is a project participant and a potential buyer of ERUs under the project. Also, this company is an investor of the project, providing equipment for the implementation of project activities as investments. The detailed contact data are given in Annex 1.

PJSC "Belotserkovskiy precast plant" is a host party of the project and a project participant. PJSC "Belotserkovskiy precast plant" is owner of the emissions source on which the realization of joint implementation project is planned. The company started its activity in Ukraine in 1966. At the beginning the company dealt with treatment of wooden columns for TL but in 1970 production of reinforced concrete supports and further-on widening of nomenclature of products took place. Detailed contact data are given in Annex 1.

A.4. Technical description of the project:

A.4.1. Location of the project:

The project is located in the city Bila Tserkva, Kyiv Region, Ukraine. Project boundaries include complex of coal sludge processing by wet method (installation LYV-300-AYN-36 and frequency converter INVT Electronics CHF100A-350G-4).

A.4.1.1. Host Party(ies):

Ukraine.

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

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

Kyiv Region.

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

City Bila Tserkva.

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 site

The project is being implemented within Kyiv Region of Ukraine where Belotserkovskiy precast plant is located: Kyiv Region, Bila Tserkva. Bila Tserkva is a city of regional subordination in Kyiv Region of Ukraine, a significant economic and cultural centre of Metropolitan Economic Area, situated 80 km to the South from Kyiv on the river Ros'. The population of the city is 210 thousand of citizens. The city is situated in the South West of Kyiv Region, the distance to the capital of Ukraine – Kiev is 84 km. the city was founded in 1032 by Kyiv prince Yaroslav the Wise. At the beginning of XX century Bila Tserkva became one of the biggest industrial and commercial centers of Kyiv province. In 1900 her operated the plant of agricultural machines, 5 brick plants, 6 leather plants, one brewery, 2 mead plants and 4 soap plants; tobacco factory, pole side factory, 2 candy factories, 4 locksmiths workshops, 42 blacksmith's shops, 2 water roller mills, 13 shellers, 2 oil mills.

Geographic coordinates of the project location site: +30°3′45.61″ E, +49°49′42.96″ N

Satellite photo of the site is given below in the Figure 2.

Figure 2: Project location site

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

The main idea of the project is the reduction of flotation coal sludge use and reduction of natural gas consumption for sludge drying. According to the project design the whole cycle of ash production from coal sludge by wet grinding technology with the use of installation LYV-300-AYN-36 and discontinuation of traditional method of ash production is introduced. According to the project Belotserkovskiy precast plant produces about 60 thousand tons/month or 720 thousand tons/year of ash, processes up to 756 thousand tons of sludge for own needs for production of reinforced concrete products and other purposes. The amount of production manufactured by the plant before technological process modernization and after it remains the same.

Transition to the new method is achieved by the introduction of the following measures:

- **Use of new equipment**:

The project includes installation of new equipment:

- *rotating induction element LYV-300-AYN-36*

The principle of operation of rotating induction element is the rotation of ferromagnetic rods in oppositely directed magnetic linear fields. Rotational speed of grinding elements in the linear magnetic field is 24,000 revolutions per minute. Amount of milling elements in a volume of 3 m^3 is 250-270 kg. Water content that is present in the work environment at such speed also becomes a grinding element and dynamically affects the processes of grinding.

- *frequency converter INVT Electronics CHF100A-350G-4*

Provides current with a frequency of 400 Hz for the operation of rotating induction element LYV-300-AYN-36.

- **Decommissioning of the old equipment**:

Project provides discontinuation of dry ash production process using drum dryers of high temperature and ball mills.

Compositions of technological complex for grinding sludge for ash production is selected considering the stable operation of all parts of the technological scheme: receiving the sludge from mud settling pit, storage, preparation, grinding at LYV devices, ash storage in bunkers, shipping ash to the external consumers and production of concrete and reinforced concrete constructions.

For production of reinforced concrete constructions ash of very small fraction is used with the relevant water and carbon content. High-temperature drying and ball mills are used for receiving ash of 60 microns fraction for technological needs with traditional production technology. Flotation sludge comes from mud settling pit to the enterprise with water content of around 40% and carbon content of 16%-19%. These characteristics of flotation sludge allow drying it on high-temperature drying, combusting up to 30 m^3 of natural gas per ton of raw materials, and having grinded dried sludge at ball mills. During drying at the temperature of 720^o-800^o thermooxidation of carbon occurs and as a result large amount of greenhouse gases is released into the atmosphere. Using floatation sludge with 16%-19% carbon content allows to somewhat reduce the use of natural gas. Thereafter dried flotation sludge with not more than 5% of water content goes to the ball mills for grinding fraction to 60 microns. If water

content of floatation sludge is more than 5% grinding at ball mills to 60 microns fraction will be impossible, i.e. it will be needed to additionally send flotation sludge for re-drying to achieve the required water content.

Introduction of new technology of wet grinding on the devices of induction rotation LYV-300-AYN-36 allows the use of floatation sludge with water content up to 53% and carbon content of 3%. This allows not using high-temperature drying and reduces GHG emissions to minimum. The principle of operation of LYV-300-AYN-36 is that these devices allow grinding flotation sludge to fraction of 45 microns without the prior high-temperature drying. Besides, the possibility of using flotation sludge with water content up to 53% saves water usage during production of reinforced concrete products. In general, due to the introduction of new technologies of wet grinding on the devices LYV-300-AYN-36 it becomes possible to move away from the use of natural gas in the process of ash production.

Technological features of ash production under traditional technology using high-temperature drying and wet grinding technology to produce high-quality flotation sludge are presented in Table 2.

Table 2 - Main types of works

#	Types of works	Traditional technology	Wet grinding technology
1	High-temperature drying	+	-
2	Grinding to 60 microns fraction	+	-
3	Grinding to 45 microns fraction	-	+

Main parameters used for baseline and project scenarios in this project are presented in Table 3.

Table 3. Main parameters of different ways of ash production.

#	Indicators	Dry production method	Wet production method
1.	Production of ash	60 thousand tons/month, 720 thousand tons/year	60 thousand tons/month, 720 thousand tons/year
2.	Specific consumption of raw sludge per ton of ash (t/t of ash)	2	1
3.	Specific natural gas consumption for drying raw sludge (m^3/t)	30 m^3/t	-
4.	Specific electricity consumption per tonne of raw material (kWh/t of ash)	4.47	5.65
5.	Water content of incoming sludge	40%	53%
6.	Carbon content in incoming sludge	16-19%	<3%
7.	Water content of ash at the output	3-4 % (brought to 53% for the final consumer)	53%
8.	Carbon content at the output during dry method of production	<3 %	<3%

Raw material base for the production of ash is waste of coal concentrating plants, which include coal and are transported from coal mud settling pit. PJSC “Belotserkovskiy precast plant” makes the purchase of raw materials (sludge mass) according to the contract.

These raw materials are processed to obtain primary, grinded concentrate of sludge by size of 45 microns to produce ash. The operating regime of installation LYV depends on the size of inward raw materials which are transported by the trucks from the mud settling pit.

Structure of the technological complex for sludge mass processing is taken with a glance to stable work of all links of technological scheme. Technological scheme of site operation on processing flotation coal sludge into ash includes the following stages:

- reception (unloading) of sludge mass from railway cars;
- transfer of sludge mass by scraper conveyor to the reception point;
- accumulation of sludge in bunker;
- transfer of sludge to LYV devices for grinding;
- supply to the bunker of ash storage;
- conducting chemical analysis of ash mass;
- supply of ash for production of commodity concrete and reinforced concrete products.

According to the project the implementation of the whole cycle of grinding coal sludge from receiving water-coal mass from mud settling pit up to upload of ash to shop of production of reinforced concrete constructions is intended.

The main process that is performed by the LYV-300-AYN-36 is the grinding of the wet sludge to the required particle size. This is achieved through processing of the grinded material in the main chamber of the installation. Special linear induction elements create a very strong magnetic field inside the camber that is used to activate rotating magnetic grinding elements – metal balls – that are located in the chamber. The energy and intensity of magnetic field and therefore the grinding quality is regulated by the control system.

The development of the project documentation for this installation for processing flotation sludge within this project was initiated in 2007. The date of putting this installation into operation is December 2007. Project implementation plan is presented below:

Table 4: Project implementation plan

Key stages of the project implementation	Date
Date of decision	11/09/2007
Investment phase start-up date	05/11/2007
Investment phase end date	01/01/2008
Operation phase start-up date	01/01/2008
Operation phase end date	31/12/2026

Installation of new equipment requires intensive pre-study for further on safe and reliable exploitation of the unit. Necessary amount of personnel will get necessary preparation from supplier of the equipment and will pass necessary exams on knowledge acquisition. At the initial stages the operation and exploitation of the installation will be controlled and operated by the technical personal of producer, and further on – technical department of the plant. Project needs in technical service will be met by local resources: own workers on performing inside services and outer contractors on repairs. The project provides trainings. All the workers must have valid

professional certificate, be periodically instructed on operational safety and pass exams. Professional education for all professional spheres needed for this project can be obtained on-site, in Kyiv Region, Kyiv.

Implementation of the complex for grinding coal sludge using wet method requires significant funds and faces a number of barriers for investments attraction, and in connection with this joint implementation mechanism was one of the determinant project factors from the very beginning, and financial advantages within this mechanism were considered to be among reasons for project realization start.

Technological process is ecologically justified and does not require application of dangerous 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:

One of the most important problems of constructing industry is reduction of financial and energy costs by means of producing effective building materials and products. That is why implementation of resources- and energy-saving technologies into the industry of building construction is paid a lot of attention to.

The project activity suggests performing of coal sludge processing by wet method of grinding, which will allow reducing greenhouse gases emissions into the atmosphere avoiding combustion of natural gas in a high-temperature dryer with simultaneous oxidation of coal component of sludge.

These measures are currently important for the given production sector in Ukraine as the operating old-fashioned technology of concrete production is very expensive and ecologically unacceptable. Ecological situation is a very popular issue in the whole world nowadays. That is why reduction in consumption of carbon energy resources and continuation of regular plant functioning is an interrelated policy of doing business.

Modernization of technology of ash production for the needs of concrete production will give an opportunity to avoid combustion of natural gas and coal which will improve ecological situation in the Region and significantly reduce CO_2 and other harmful elements emissions. Reduction of expenditure on purchasing energy will help to intensify funds for the implementation of further measures to improve the process of production of the plant products and reduce the negative impact on the environment.

Ash produced with the use of project installations will allow reducing use of flotation sludge and cement for concrete production. Considering reduction of use of cement and energy costs of the technology for receiving this essential component for production of reinforced concrete items it becomes clear that even insignificant reduction of cement use leads to considerable reduction of greenhouse gases emissions by the producing plants. Emission reductions can be sold as ERUs in the international emissions trading market.

Greenhouse gases emissions reduction is achieved as a result of:

- Modernization of technology of processing coal sludge into ash, which is used by Bila Tserkva plant in the production of concrete of better quality, resulting in the reduction of greenhouse gases (GHG);
- Discontinuation of using high-temperature dryers that combust natural gas in the production of ash.

Emission reductions resulting from this project implementation will come from these main sources:

- Removal of sources of greenhouse gases emissions, resulting from natural gas combustion during high-temperature drying;
- Removal of sources of greenhouse gases emissions during carbon oxidation by high-temperature sludge drying;

Implementation of the project technology is rather cost-based and its effect of investment is lower than Capex. There are also a lot of other negative factors on the way of these measures implementation, such as undetermined amount of coal content in received sludge mass, periodicity and instability of target market of reinforced concrete production in Ukraine. In addition this issue is not being solved at the state level in Ukraine, support or stimulation of this sector are also absent. Efforts aimed at modernization of production technology do not contravene with any law and correspond to the valid legislation of Ukraine on Environmental Protection. The proposed project is positively estimated by the local authorities.

Detailed description of the baseline and general analysis of additionality are presented in Section B of this project design documentation.

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

Table 5: Estimation of emission reductions volumes during the crediting period

	Years
Length of the crediting period	5 years
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
Year 2008	855315
Year 2009	738484
Year 2010	678096
Year 2011	725519
Year 2012	791126
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	**3 788 540**
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	**757 708**

Table 6: Estimation of emission reductions volumes after the crediting period

	Years
Length of the period after 2012 for which emission reductions were estimated	14 years
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
Year 2013	892947
Year 2014	892947
Year 2015	892947
Year 2016	892947
Year 2017	892947
Year 2018	892947
Year 2019	892947
Year 2020	892947
Year 2021	892947
Year 2022	892947
Year 2023	892947
Year 2024	892947
Year 2025	892947

Year 2026	892947
Total estimated emission reductions over the stated period (tonnes of CO_2 equivalent)	**12 501 258**
Annual average of estimated emission reductions over the stated period (tonnes of CO_2 equivalent)	**892 947**

Length of the crediting period during the first commitment period under the Kyoto Protocol is 5 years or 60 months in this project.

A.5. Project approval by the Parties involved:

Letter of Endorsement # 2755/23/7 dated 26/09/2012 was provided by the State Environmental Investment Agency of Ukraine.

According to the national Ukrainian procedure Letter of Approval from Ukraine is expected after project determination process.

SECTION B. Baseline

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

The baseline scenario of the JI project should be set according to the requirements of Appendix B to Decision 9/CMP.1 (JI Guidelines)[1], further meeting the requirements of the "Guidance on criteria for baseline setting and monitoring", developed by the Joint Implementation Supervisory Committee (JISC). According to the "Guidance on criteria for baseline setting and monitoring" (version 03)[2] (hereinafter referred to as Guidance), the baseline for a JI project is the scenario that reasonably represents the anthropogenic emissions of greenhouse gases by sources or anthropogenic removals by sinks of GHGs that would **occur in the absence of the project**.

According to 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, according to the paragraph 4(a) of Decision 10/CMP.1; as well as methodologies for a forestation/reforestation project activities. Paragraph 11 of the Guidance allows project participants that select the JI specific approach to use the selected elements or combinations of approved CDM baseline and monitoring methodologies; or, if necessary, approved CDM methodologies or methodological tools.

Description and justification of the baseline chosen are given below in accordance with "Guidance for Users of the Implementation Project Design Document Form"[3] version 04, using the following step-wise approach:

Step1. Identification and description of the chosen theoretical approach for baseline scenario setting

The project participants selected the following approach for the baseline setting defined in the Guidance (Paragraph 9):

> (a) An approach for baseline setting and monitoring developed in accordance with appendix B of JI Guidance (JI specific approach).

Project participants should provide a detailed theoretical baseline description performed in clear and transparent manner and baseline justification according to paragraphs 23-29 of the Guidance.

The baseline for this project should be determined according to Annex B of JI Guidance. Despite this, the baseline should be determined by means of listing and description of probable future scenarios on the basis of conservative assumptions and choice of the most plausible among them. Taking into account JI specific approach chosen for the baseline setting according to the Paragraph 24 of the Guidance, the baseline is identified by means of listing and description of probable future scenarios on the basis of conservative assumptions and selecting the most plausible among them.

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

After having all the options of the baseline scenario development analyzed, there were determined two scenarios one of which depicted project scenario with JI stimulation. For demonstration of project additionality there was given clear and transparent information concerning project additionality demonstration with the use of the most recent version of the "Tool for the demonstration and assessment of additionality" approved by the CDM Executive Board.

[1] http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=2 (latest access – 18.07.2012)
[2] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf (latest access – 18.07.2012)
[3] http://ji.unfccc.int/Ref/Documents/Guidelines.pdf (latest access – 18.07.2012)

Description of possible future baseline scenarios is based on the following important factors: policy and legislation aimed at reformation of this industrial sector, economic picture in the country and socio-demographic factors in relevant sectors, stability of demand in the market, investments, prices for fuel and its availability, national and/or regional plans as for energy sector extension.

Step 2. Application of the approach chosen

Baseline is determined by the choice of the most plausible scenario from the list and by description of probable future scenarios on the basis of conservative assumptions for baseline setting. The following steps were applied for determining the most plausible baseline scenario:

- Determination of possible future scenarios which could be baseline scenario;
- Justification of excluding from consideration of the alternatives which are not plausible due to technological or investment barriers.

Sub-step 2a. Identification and enumeration of plausible future scenarios.

Scenario1. Continuation of existing situation.

Continuation of existing situation means situation when existing technology with the use of high-temperature drying of flotation sludge and ball mills is being used at the plant. This process leads to significant greenhouse gas emissions from natural gas combustion, electric power consumption from the electric grid of Ukraine, oxidation of carbon contained in sludge. Coal sludge is supplied by the railroad transport from the suppliers (coal washing facilities and coal mines) located in the Donetsk and Luhansk regions of Ukraine.

Scenario 2. Purchase and usage of fly-ash from TPP.

Usage of fly-ash from TPP is possible as filling materials and additives in production of monolith, precast concrete and reinforced concrete. Ash formation takes place during emission of fine and light fractions which are carried away by the flue gases from the furnaces and are caught by filters of the thermal plant in ash collectors. In this manner ash of dry selection is received. In the process of ash collectors cleaning with water ash and slag like pulp comes into dumps and settlers. The main masses of ash and slag materials are stored in these dumps and settlers.

Scenario 3. Production of ash according to the wet method grinding technology in the absence of incentives from JI project implementation.

Coal sludge processing takes place on new equipment which uses wet method of sludge grinding up to the necessary fraction. The process of high-temperature drying with use of natural gas and use of ball mills are out of use. Coal sludge is supplied by the railroad transport from the suppliers (coal washing facilities and coal mines) located in the Donetsk and Luhansk regions of Ukraine. Prepared ash is directly supplied to the Bila Tserkva plant of reinforced concrete constructions and other consumers as necessary.

Sub-step 2b. Barrier analysis

Scenario1. Continuation of existing situation

This scenario does not provide any measures, thus any barriers are absent.

Scenario 2. Purchase and usage of fly-ash from TPP.

Technological barriers: Use of ash sludge from TPP for concrete production which is used for production of reinforced concrete constructions has been realized on the territory of Ukraine and has positive as well as negative factors. Fly-ash is the rest which is not burnt out in the boilers and which consist of mineral admixtures of fuel during hard fuel combustion. Improvement of concrete quality, increase in plasticity of building mortars, reduction of cement consumption up to 20% - are the main advantages of dry ash and when it is used the building costs are reduced and the technical operations are improved. High inhomogeneity of ash content, oversize of fraction and incomplete combustion of coal that reaches 10% and needs additional preparation are factors which can be related to negative ones. Large amount of ash cannot be always received from one source, as the most coal boiler installations are operating during heating season which causes additional organizational and technical difficulties.

There are cases when ash sludge heaps are in extremely bad condition, and are frequently used for drop of other waste products: domestic and industrial. Ash transportation to far distances by means of railway or automobile transport needs organizational measures and significant financial costs. Besides this, the quality of goods received from supplier may be unsatisfactory with further returning of the ware and long procedure of getting funds back.

Scenario 3. Production of ash according to the wet method grinding technology in the absence of incentives from JI project implementation.

Technological barriers: Implementation of technology of wet grinding is a complicated technical process which includes stages of designing, purchase of high-technology equipment, training of personnel and exploitation of industrial facilities. Thus these activities need qualified staff in sectors of industrial activities conducting and forecasting, exploitation of complicated machines and mechanisms, which are not considered to be technologies of general use. If qualification of the personnel of PJSC "Belotserkovskiy precast plant" will appear to be poor, equipment producers will conduct trainings for the personnel.

Investment barriers: Low norm of investment attractiveness of the given project does not provide the project owner with possibility of making definite decision as for its realization. This scenario is financially unattractive and risky.

This is associated with:

- Use of new technology of ash preparation;
- Necessity of detailed pre-research with the purpose of identification of weak points which need modernization and also designing of project decisions which should be based on the principles of absolute reliability taking into account risks in case of emergency condition;
- Necessity of continuous training of personnel for work with new equipment;
- Arranging raw materials supply.

For more detailed information, please, see Section B.2.

Sub-step 2d. Baseline setting.

All the presented scenarios face a number of barriers except for Scenario 1 – "Continuation of existing situation". Thus continuation of existing situation is the most plausible future scenario and it is chosen as a baseline scenario in accordance with paragraph 24 of the Guidance.

This baseline scenario has been established according to the criteria outlined in the Guidance, specifically Paragraphs 21, 25 and 26:

- 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 economy 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 generates ash, 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:
    - 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;
    - Default values were used to the extent possible in order to reduce uncertainty and provide conservative data for emission calculations.
    - GHG emission reductions by plants producing cement at the cost of reduction of its use for reinforced concrete constructions production are excluded for conservative reasons.

The following key factors influencing the plausible baseline scenario were taken into account, as per paragraph 25 of the Guidance:

1) **The sector reform policy and legislation.** The State Industry Development Program for 2003–2011[4] was taken into account in the process of project development. This program provides three periods of development:
    a) During the first preparation period (2003) the program provides creation of conditions for activation of the state efforts as for industry development, in particular to focus state efforts on industry development and designing favourable legislative conditions for future development and reforming of the taxation sector;
    b) The second period (2003-2006) provides further development of the first period initiatives with the purpose of transformation of industrial sector into a high efficiency system based on self-reproduction and stable accelerated development;
    c) The third period (2006-2011) provides wide implementation of new science-driven technologies with improved technical and economical characteristics, reduced energy- and source-intensity of production,

[4] http://industry.kmu.gov.ua/control/uk/publish/article?art_id=36412&cat_id=36198

complex automation and informatization of production processes and also implementation of other effective changes in the sphere of industry.

Nevertheless it is provided that companies will finance these improvements at their own expenses or from bank loans which actually means that the Ukrainian government does not interfere with this process and the program fulfilment is totally dependent on the market conditions and availability of financial resources. In case of availability of stimulations from the Program activity they could partially remove existing barriers which prevent project realization. However no specific mechanisms for providing companies with financial aid were designed. Thus plants in Ukraine have no obligations as for implementation of any energy saving measures. Taking into account the information given above in can be assumed that none of the legislative acts in the sector influences the baseline scenario;

2) **Economic situation/economic growth and socio-demographic factors in a certain sector of economy and expected demand conditioned by this.** The company production consumers include construction companies of Ukraine. Volume of the production of reinforced concrete constructions at the plant depends on the level of the demand from core consumers which in its turn depends on the real estate market and construction market tendencies. It is provided that the project does not affect the level of the production of goods and demand for them; production capacities of the plant were not increased within the project activity. The main influences are economic picture in the world and decisions of the company management. Thus increase or decrease of demand or production level during project activity is considered as satisfactory situation in the baseline scenario (it is assumed that the production level in the baseline scenario will be the same as in the project scenario).

3) Capital availability (including investment barriers). Ukraine is considered to be a country with high risk for making investments and doing business. Key factors of doing business in Ukraine are demonstrated in the table below.

Table 7: International ratings of Ukraine [5]

Indicators	2006	2007	2008	2009	Explanation
Corruption index of Transparency International	99 position from 163	118 position from 180	134 position from 180	-	Index of corruption
Rating of business practices of The World Bank (The Doing Business)	124 position from 155	118 position from 179	139 position from 178	145 position from 181	Rating of conduct of business (ease of company opening, licensing, staff employment, registration of ownership, receipt of credit, defense of interests of investors)
The IMD World Competitiveness Yearbook	46 position from 55	46 position from 55	54 position from 55	56 position from 57	Research of competitiveness (state of economy, efficiency of government, business efficiency and state of infrastructure)
Index of Economic Freedom of Heritage Foundation	99 position from	125 position	133 position	152 position from	Determination of degrees of freedom of economy (business, auction, financial, monetary, investment,

[5] Data of State Agency on Investment and Innovation of Ukraine

	157	from 161	from 157	179	financial, labour freedom, freedom from Government, from a corruption, protection of ownership
Global Competitiveness Index of World Economic Forum	69 position from 125	73 position from 131	72 position from 134	-	Competitiveness (quality of institutes, infrastructure, macroeconomic stability, education, development of financial market, technological level, innovative potential)

Risks of doing business in Ukraine have great influence on capital endowment in the country. According to the official data of the National Bank of Ukraine[6] commercial interest rates in euro for the period more than 5 years in Ukraine violated between 8% and 10.4% in October 2010. Thus in contrast, according to the data of the European Central Bank[7] the same index for the same period violated from 2.3% to 3.6% in Germany. The cost of debt financing in Ukraine is at least two times higher than in Eurozone. The risks of investing into Ukraine are additionally confirmed by the country ratings provided by the "Moody's international rating" agency and the associated country risk premium. Payment risks (%) for Russia and Ukraine are compared in the table below[8]:

Table 8: Risk premiums (%) for Russia and Ukraine

Total Risk Premium, %	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Russia	6.6	6.64	6.52	8	6.9	7.25
Ukraine	10.8	10.16	10.04	14.75	12.75	12.5

It can be seen from the table above that Russia which suggests worth complex of investment opportunities is a country with considerably smaller degree of risk if compared to Ukraine. High interest rates and insufficient resources of financial institutions complicate big infrastructure projects financing. Such projects rely on direct investments or collaboration with private investors, international financial institutions and government. Large-scale infrastructure projects financed by private companies can be hardly found in Ukraine.

4) **Availability of skills, know-hows in technological area and perspective of having the best technologies and techniques in future.** Given the global market know-how technologies from the developed countries are available in Ukraine but their price is high and their implementation requires availability of qualified personnel which will be able to install and maintain this equipment. At present the absence of investments and experience of using modern technologies in Ukraine complicates possible implementation of modernized projects and further development of industrial sector.

5) **Prices for fuel and its availability.** Electric power, coal and natural gas are the main energy resources used in Ukraine. Their distribution nets are well developed and these sources of energy are available for most of the industrial consumers. The major part of Ukrainian coal is produced in Luhansk Region and Donetsk Region. Natural gas is mainly imported from Russia. Electric power in Ukraine is mainly produced by the

[6] Statistical Release. Archive, Interest Rates, 2010. http://www.bank.gov.ua/doccatalog/document?id=66258 (latest access – 18.07.2012)
[7] Germany, Harmonised long-term interest rates for convergence assessment purposes http://sdw.ecb.europa.eu/browse.do?node=bbn642 (latest access – 18.07.2012)
[8] Data is provided by Aswath Damodaran, Ph.D., Stern School of Business NYU http://pages.stern.nyu.edu/~adamodar/ (latest access – 18.07.2012)

atomic and thermal power plants which operate on fossil fuels (main types of fuel are natural gas and coal). The wholesale electricity market which is subordinated to the state enterprise Enerhorynok is a well-ordered system of performing electric power purchase and sale operations. Prices for electric power and natural gas significantly depend on the demand level and consumers' category, and are regulated by the National Electricity Regulatory Commission of Ukraine which has a special department for making and monitoring prices and tariffs. Prices for coal are set by the coal producers – private and state enterprises.

Emissions under the baseline scenario

To calculate emissions under the baseline scenario the following assumptions were made:

1) Amount of the production manufactured by the plant during the period before technological process modernization as well as after it remains the same;
2) Calculation of emission factor from electric grid is based on the current data of thermal power plants activity, electric grid operator and companies supplying electric power;
3) Quality characteristics of the products after the project implementation correspond to quality characteristics of the products before reconstruction. Production satisfies the same demand as before reconstruction;
4) Amount of natural gas consumption under old technology corresponds to the value of the average specific use of fuel for high-temperature dryer 1 ton of sludge;
5) Amount of the electric power consumption under old technology corresponds to the value of average specific use for production of 1 ton of ash;

Baseline emissions come from three main sources:

1) Carbon dioxide emissions caused by natural gas combustion during high-temperature drying of sludge mass;
2) Carbon dioxide emissions during high-temperature drying caused by oxidation of coal which is contained in coal sludge;
3) Carbon dioxide emissions caused by electric power consumption for the process of sludge mass grinding in ball mills

List of constant values of parameters used for calculation of the emissions under the baseline scenario is presented below:

Table 9: List of constant values to calculate baseline emissions

Data / Parameter	***Measurement unit***	***Description***	***Data source***	***Value***
$SMC_{BL,Slag}$	t of sludge/t of ash	Specific sludge consumption for ash production in the baseline scenario	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.	2

$SFC_{BL,NG}$	m^3/t	Specific natural gas consumption for sludge drying in the baseline scenario	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.	30
$C_{BL,Slag}$	Fraction	Mass fraction of carbon in the sludge in baseline scenario that is oxidized	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.	0.16
$NCV_{NG,y}$	GJ/m^3	Net calorific value of natural gas in period *y*	National Inventory Report in Ukraine for 1990-2010 pages 456, 462, 468[9] (1.A.2.f – Other sectors of Industry and Construction). Value converted from GJ/1000 m^3 to TJ/m^3.	0.000034
$C_{NG,y}$	t C/TJ	Carbon content in natural gas in period *y*	National Inventory Report in Ukraine for 1990-2010 pages 458, 464, 470[10] (1.A.2.f – Other sectors of Industry and Construction).	in 2008 – 15.17 in 2009 – 15.2 in 2010 and later on – 15.17
$OXID_{NG,y}$	fraction	Coefficient of carbon oxidation in baseline scenario (for natural gas)in period *y*	National Inventory Report in Ukraine for 1990-2010 pages 459, 465, 471[11] (1.A.1.a – Electric power and heat production)	in 2008 – 0.995 in 2009 – 0.995 in 2010 and later on – 0.995
$OXID_{BL,y}$	fraction	Coefficient of carbon oxidation in baseline scenario (for coal)in period *y*	National Inventory Report in Ukraine for 1990-2010 pages 459, 465, 471[12] (1.A.1.a – Electric power and heat production)	in 2008 – 0.963 in 2009 – 0.963 in 2010 and later on – 0.962
$SEC_{BL,Ash}$	MWh/t of ash	Specific consumption of electricity for production of ash in baseline scenario.	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation	0.00447

[9] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[10] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[11] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[12] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

			shop included in the plant structure. Technical reports will be provided to AIE during determination process.	
$EF_{EL,grid,y}$	tCO_2/MWh	Specific indirect carbon dioxide emission factor from electricity consumption by the 2nd class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052 in period *y*.	In 2008 - Order of the National Environmental Investment Agency # 62 dated 15.04.2011.[13]	1.219
			In 2009 - Order of the National Environmental Investment Agency # 63 dated 15.04.2011.[14]	1.237
			In 2010 - Order of the National Environmental Investment Agency # 43 dated 28.03.2011.[15]	1.225
			In 2011 and later on - Order of the National Environmental Investment Agency #75 dated 12.05.2011.[16]	1.227

Emissions[17] under the baseline scenario are calculated in the following way:

$$BE_y = BE_{FC,y} + BE_{CO,y} + BE_{EL,y} \quad \textit{(Equation 1)}$$

where:

$BE_{FC,y}$ - GHG emissions in baseline scenario from natural gas consumption for sludge drying in period *y*, tCO_2e ;
$BE_{CO,y}$ – GHG emissions in baseline scenario from carbon oxidation in the sludge in period *y*, tCO_2e;
$BE_{EL,y}$ - GHG emissions in baseline scenario from electricity consumption in period *y*, tCO_2e.

GHG emissions in baseline scenario from natural gas consumption for drying sludge are in turn calculated as follows:

$$BE_{FC,y} = P_{Ash,y} \times SMC_{BL,Slag} \times SFC_{BL,NG} \times NCV_{NG,y} \times C_{NG,y} \times OXID_{NG,y} \times \frac{44}{12} \quad \textit{(Equation 2),}$$

where:
$BE_{FC,y}$ - GHG emissions in baseline scenario from natural gas consumption for drying sludge in period *y*, tCO_2e;
$P_{Ash,y}$ – Production of ash in period *y*, t;
$SMC_{BL,Slag}$ – Specific consumption of sludge for production of ash in baseline scenario, t/t;
$SFC_{BL,NG}$- Specific consumption of natural gas for drying sludge to produce ash, m^3/t;
$NCV_{NG,y}$ – Net calorific value of natural gas, GJ/m^3;
$C_{NG,y}$ – The content of carbon in natural gas within the period y, t C/TJ;

[13] http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[14] http://www.neia.gov.ua/nature/doccatalog/document?id=127172
[15] http://www.neia.gov.ua/nature/doccatalog/document?id=126006
[16] http://www.neia.gov.ua/nature/doccatalog/document?id=127498
[17] Calculation results are provided in metric tons of CO_2-eq., i.e. 1 tCO_2-eq. = 1 tCO_2.

$OXID_{NG,y}$ - Carbon oxidation rate for natural gas within the period y, fraction;
$44/12$ – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2.

GHG emissions in baseline scenario from carbon oxidation in the sludge are in turn calculated as follows:

$$BE_{CO,y} = P_{Ash,y} \times SMC_{BL,Slag} \times C_{BL,Slag} \times OXID_{BL,y} \times 44/12, \quad \textit{(Equation 3),}$$

where:

$BE_{CO,y}$ - GHG emissions in baseline scenario from carbon oxidation in the sludge in period *y*, tCO_2e;
$P_{Ash,y}$ – Production of ash in period *y*, t;
$SMC_{BL,Slag}$ – Specific consumption of sludge for production of ash in baseline scenario, t/t;
$C_{BL,Slag}$ - Mass fraction of carbon in the sludge in baseline scenario that is oxidized, fraction;
$OXID_{BL,y}$ – Coefficient of carbon oxidation in baseline scenario (for coal) in period *y*, coefficient;
$44/12$ – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2.

GHG emissions from electricity consumption are in turn calculated as follows:

$$BE_{EL,y} = P_{Ash,y} \times SEC_{BL,Ash} \times EF_{EL,grid,y}, \quad \textit{(Equation 4),}$$

where:

$BE_{EL,y}$ - GHG emissions in baseline scenario from electricity consumption in period *y*, tCO_2e;
$P_{Ash,y}$ – Production of ash in period *y*, t;
$SEC_{BL,Ash}$ – Specific consumption of electricity for production of ash in baseline scenario, MWh/t;
$EF_{EL,grid,y}$ - Specific indirect carbon dioxide emission factor from electricity consumption by the 2nd class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052 in period *y,* tCO_2/MWh

Main information and data for baseline setting are presented in tables below:

Table 10: Ash amount produced with the use of wet method of sludge grinding

Data/Parameter	$P_{Ash,y}$
Data unit	t
Description	Ash production in period *y*
Demonstration/monitoring term	Should be periodically monitored
Data source (to be) used	Project owner documentation. Data of weighting point.
Values of data applied (for expected calculations/definitions)	Provided by project owner
Justification of data choice or description of methods and procedures of measurements (to be) applied	Measured during ash shipment to the production site. On-site measurement for commercial purposes
Procedures of quality providing/control (to be) applied	According to the entire policy of the project owner

Comments	No

Table 11: Specific sludge consumption for ash production in the baseline scenario

Data/Parameter	$SMC_{BL,Slag}$
Data unit	t/t
Description	Specific sludge consumption for ash production in the baseline scenario
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.
Values of data applied (for expected calculations/definitions)	Provided by the project owner. See Table 7.
Justification of data choice or description of methods and procedures of measurements (to be) applied	Data adopted according to the technological documents of the project owner.
Procedures of quality providing/control (to be) applied	According to the entire policy of the project owner
Comments	No

Table 12: Specific natural gas consumption for sludge drying for ash production

Data/Parameter	$SFC_{BL,NG}$
Data unit	m^3/t
Description	Specific natural gas consumption for sludge drying for ash production
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.
Values of data applied (for expected calculations/definitions)	Provided by the project owner. See Table 7.
Justification of data choice or description of methods and procedures of measurements (to be) applied	Data adopted according to the technological documents of the project owner.
Procedures of quality providing/control (to be) applied	According to the entire policy of the project owner
Comments	No

Table 13: Net calorific value of natural gas

Data/Parameter	$NCV_{NG,y}$
Data unit	TJ/m^3
Description	Net calorific value of natural gas
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	National Inventory Report in Ukraine for 1990-2010, pages 456, 462, 468[18] (1.A.2.f – Other sectors of Industry and Construction). Values converted from GJ/ 1000 m^3 to TJ/m^3.
Values of data applied (for expected calculations/definitions)	0.000034
Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.
Comments	No

Table 14: Carbon content in natural gas

Data/Parameter	$C_{NG,y}$
Data unit	t C/TJ
Description	Carbon content in natural gas in period *y*
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	National Inventory Report in Ukraine for 1990-2010, pages 458, 464, 470[19] (1.A.2.f – Other sectors of Industry and Construction)
Values of data applied (for expected calculations/definitions)	In 2008 – 15.17 In 2009 – 15.2 In 2010 and later on – 15.17
Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.
Comments	No

Table 15: Coefficient of carbon oxidation in baseline scenario (natural gas)

Data/Parameter	$OXID_{NG,y}$
Data unit	fraction
Description	Coefficient of carbon oxidation in baseline scenario (natural gas)
Demonstration/monitoring term	Fixed ex-ante

[18] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[19] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

Data source (to be) used	National Inventory Report in Ukraine for 1990-2010, pages 459, 465, 471[20] (1.A.1.a – Electricity and heat production)
Values of data applied (for expected calculations/definitions)	0.995
Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.
Comments	No

Table 16: Mass fraction of carbon in the sludge in baseline scenario that is oxidized

Data/Parameter	$C_{BL,Slag}$
Data unit	fraction
Description	Mass fraction of carbon in the sludge in baseline scenario that is oxidized
Demonstration/monitoring term	monthly
Data source (to be) used	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.
Values of data applied (for expected calculations/definitions)	0.16
Justification of data choice or description of methods and procedures of measurements (to be) applied	Laboratory researches
Procedures of quality providing/control (to be) applied	According to national standards measurement of carbon content in flotation sludge was performed in accordance with GOST 25818-91 "Thermal plant fly-ashes".
Comments	No

Table 17: Coefficient of carbon oxidation in baseline scenario (for coal)

Data/Parameter	$OXID_{BL,y}$
Data unit	fraction
Description	Coefficient of carbon oxidation in baseline scenario (for coal) in period y
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	National Inventory Report in Ukraine for 1990-2010, pages 459, 465, 471[21] (1.A.1.a – Electricity and heat production)

[20] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

Values of data applied (for expected calculations/definitions)	In 2008 – 0.963 In 2009 – 0.963 In 2010 and later on – 0.962
Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.
Comments	No

Table 18: Specific electric energy consumption for ash production in the baseline scenario

Data/Parameter	$SEC_{BL,Ash}$
Data unit	MWh/t
Description	Specific electric energy consumption for ash production in the baseline scenario
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.
Values of data applied (for expected calculations/definitions)	0.00447
Justification of data choice or description of methods and procedures of measurements (to be) applied	Data were taken according to the technological documents of the project owner.
Procedures of quality providing/control (to be) applied	According to the entire policy of the project owner.
Comments	No

Table 19: Specific indirect carbon dioxide emission factor from electricity consumption

Data/Parameter	$EF_{EL,grid,y}$
Data unit	tCO_2/MWh
Description	Specific indirect carbon dioxide emission factor from electricity consumption by the 2nd class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052 in period *y*, tCO_2/MWh
Demonstration/monitoring term	Fixed beforehand
Data source (to be) used	Orders of DFP of Ukraine.
Values of data applied (for expected	In 2008 – Order of the National 1.219

[21] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

calculations/definitions)	Environmental Investment Agency # 62 dated 15.04.2011.[22]	
	In 2009 – Order of the National Environmental Investment Agency # 63 dated 15.04.2011.[23]	1.237
	In 2010 – Order of the National Environmental Investment Agency # 43 dated 28.03.2011.[24]	1.225
	In 2011 and later on - Order of the National Environmental Investment Agency # 75 dated 12.05.2011.[25]	1.227
Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.	
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.	
Comments	No	

Leakage:

Leakage is a part of anthropogenic emissions by sources and/or GHG removals by sinks which could take place outside project boundaries and can be measured and related directly to the JI project.

Project implementation does not result in any leakage.

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:

According to the "Guidance for Users of the Implementation Project Design Document Form" version 04[26], the following step-wise approach is used to demonstrate that the project provides emission reductions by sources which are additional to those that could take place under the project absence:

Step 1. Indication and description of the approach applied

According to the Paragraph 44 (c) of the "Guidance on criteria for baseline setting and monitoring" version 03[27] the "Tool for the demonstration and assessment of additionality", approved by CDM Executive Board, is used to demonstrate additionality. During development of this document the latest version of the "Tool for the demonstration and assessment of additionality" approved by CDM Executive Board was version 6.0.0, that is why it was used to demonstrate additionality of the project activity.

[22] http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[23] http://www.neia.gov.ua/nature/doccatalog/document?id=127172
[24] http://www.neia.gov.ua/nature/doccatalog/document?id=126006
[25] http://www.neia.gov.ua/nature/doccatalog/document?id=127498
[26] http://ji.unfccc.int/Ref/Documents/Guidelines.pdf
[27] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

Step 2. Application of the approach chosen

The following check stages are applied in compliance with "Tool for the demonstration and assessment of additionality", version 6.0.0.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Realistic and reliable alternatives to the project activity will be defined through the following sub-steps:

Sub-step 1a: Identification of alternatives to the project activity

The following alternatives for the proposed project were identified:

Alternative1. Realization of the shift to new method of ash production at the plant without JI Project (proposed project activity without stimulation from the JI mechanism)

In this scenario the enterprise realizes a complex of project measures aimed at modernization of the method of ash production. This scenario resembles the project activity nevertheless in this case the enterprise does not benefit from JI Project development.

Alternative 2. Continuation of existing situation

This scenario is a continuation of a general enterprise's activity which provides absence of significant investments in the area of ash production at the enterprise. The enterprise uses the existing equipment which is able to work but consumes a great amount of natural gas and electric power.

Outcome of Step1a: Realistic and reliable alternatives of the project activity were identified.

Sub-step 1b: Identification of consistency with mandatory applicable laws and regulations

There are no any requirements of the valid legislation that would make the enterprise change its current production practice as:

- Existing equipment is able to work without modernization activity;
- Equipment installed at the enterprise meets all the requirements of valid legislation, and no relevant changes to the mandatory laws are planned in future years.
- Existing production practice is consistent with requirements of mandatory laws in the sphere of ecologic.

Under such circumstances it is evident that the identified alternatives do not contravene the valid mandatory laws and regulations of Ukraine.

Outcome of sub-step 1b: Realistic and reliable alternative scenarios for the project activity which meet mandatory laws and regulations of Ukraine were defined taking into account their practical application.

Step2. Investment analysis

Investment analysis in the context of additionality is aimed at identification of if the proposed project is:

a) The most attractive from economic and financial point of view; or
b) Economically and financially justified without revenue from ERUs sale.

Sub-step 2a: Identification of relevant method of analysis

In general there are three methods which can be applied to investment analysis: simple analysis of expenditures, comparative investment analysis and comparative efficiency analysis.

Simple analysis of expenditures (Option I) is applied when the proposed JI Project and its alternatives identified in Stage 1 do not bring financial profit except for revenue from ERUs sale. The implementation of the proposed project will result in electric energy saving due to realization of complex of energy saving measures at the enterprise. Thus this method of analysis is not applicable.

In comparative investment analysis (Option II) relevant financial indexes for realistic and reliable alternative investments are compared. As continuation of the current situation is the most plausible alternative, the benchmark analysis will be applied (Option III).

Sub-step 2b: Variant III. Application of the comparative efficiency analysis

To conduct comparative efficiency analysis of the proposed project at PJSC "Belotserkovskiy precast plant" Net Present Value (NPV) index is used. The analysis' aim is to demonstrate that project implementation not as JI project will not be financially attractive and will lead to negative value of NPV. Comparative analysis was chosen for a number of the following reasons:

1. Project owner does not have a formalized entire competitive analysis which is systematically applied to during project evaluation process;
2. There is no approved state comparative analysis of project efficiency in Ukraine;
3. Positive/negative Net Present Value is a generally accepted index of project evaluation. A lot of financial experts on project evaluation stand for its use while Internal Rate of Return is considered to be controversial and is not recommended to be used as a single index of efficiency evaluation during project analysis process[28].

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

Financial analysis refers to the moment when decision as for investments is being taken. Data provided by project participants were used for calculations.

The following assumptions were made to calculate cash flows and indicators:

1) Date of making decision on investment is 11 September 2007. Prices tariffs and expenditures for the analysis were taken as for this date;
2) Reduction of water consumption has not been taken into account while considering savings effects of the project. In the context of analysis this is conservative.
3) Net Present Value (NPV) is calculated for the period 2008-2026 (19 years);
4) All the calculations will be performed in the local currency – hryvna (UAH)

[28] *Corporate Finances Principles*, 7th edition, Richard A. Braly, Stuart C. Mayers, publisher McGraw-Hill Higher Education, 2003. – p. 105

Weighted average cost of capital year on year was taken as a rate for NPV calculation. This rate was calculated on the basis of making assumption on equal correspondence of loan and own capital in the project financing. This rate was chosen as a complex indicator which takes into account cost of risk-free financing increased by the level of risk which is common of project financing in the stated period. Final rate value is 13.91 %. To calculate project indicator and compare it with a reference benchmark a model of cash flows under the project was designed.

Results of the NPV calculation are presented below:

Table 20: Financial indicators of the project

Project activity	***NPV, thousands of Euro (EUR)***
Realization of the complex of energy saving measures at the enterprise	-12 287

As it can be seen from the table the possible project activity leads to negative Net Present Value under the current rate. It means that any investor willing to invest in the project will lose funds instead of earning. Thus the project cannot be considered as financially attractive.

Sub-step 2d: Sensitivity analysis

In order to demonstrate whether the reports on the financial / economic attractiveness executed under the terms of weighted fluctuations in the critical assumptions are reliable, one should conduct sensitivity analysis as indicated in the methodological works of the "Instrument for the demonstration and assessment of additionality" version 6.0.0. According to "The methodology of evaluation of investment analysis" [29] which the given Instrument refers to, deviation of main factors of sensitivity analysis should be at least within +10% and -10%.

During sensitivity analysis we have considered two main components: the investment costs and the cost of natural gas. Other components and factors together make less than 5% of total project costs or total project revenues; therefore they were not taken into account during this analysis.

There are four scenarios that are proposed to study the results of sensitivity analysis.

Scenario 1 involves 10% reduction of investment costs required for the project implementation.

Scenario 2 is based on the assumption of 10% of increase in the cost for natural gas.

Scenario 3 considers 10% growth of investment costs for the enterprise.

Scenario 4 is based on the assumption of 10% reduction in the cost of natural gas for the enterprise.

The analysis results are given in table below.

[29] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

Table 21: Project sensitivity analysis

Scenario	***NPV, thousands of Euro (EUR)***
Baseline case	-12 287
Scenario 1	-8 274
Scenario 2	-9 520
Scenario 3	-16 299
Scenario 4	-15 053

As we can see from the table, the project does not achieve a positive net present value under the specified assumptions. Thus, the above given results of the sensitivity analysis repeatedly confirmed the reliability of the conclusions drawn in the sub-step 2c. We may conclude that the project is not financially/economically attractive.

Step 2 Conclusion: After the sensitivity analysis, we may conclude that proposed JI project is not financially/economically attractive.

Step 3: Barrier analysis

This type of analysis is not performed.

Stage 4: Common practices analysis

Sub-step 4a: The analysis of other measures similar to those proposed under the project:

It is a common practice in Ukraine to use old production facilities that remained from Soviet times without investing significant money and conducting only small repairs scheduled for maintenance of the equipment operational capacity. Existing plants for the production of concrete structures in Ukraine constitute large enterprises with a broad infrastructure consisting mostly of obsolete equipment and wide staff of employees. These enterprises, usually, try to keep the current activities from decline and do not have sufficient funds to implement investment programs.

There are no any projects in Ukraine similar to the present one, thus it can be considered to be a unique in its kind.

Sub-step 4b: Discussion of any similar existing Options:

The performance of the sub-step 4b under the Instrument is required in cases where the project is widespread and common. The proposed project is not a common practice on a particular area (see sub-step 4a). No any similar activity had been ever observed in Ukraine. Therefore, this sub-step is not applicable. The afore-specified facts allow concluding that the proposed JI project does not constitute a common practice in Ukraine.

The sub-steps 4a and 4b were satisfied, i.e. that there were no any similar measures taken. Thus, the proposed project activity doesn’t constitute a common practice.

Conclusion: The additionality analysis demonstrated that emission reductions from the project are additional against any reductions that could occur without the project.

Step 3. Substantiation of the project's additionality

The investment analysis demonstrating financial indicators of the projects had been provided to the determiner.

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

The project activity is limited by production capacity of the project equipment and plant. In the industrial area of PJSC "Belotserkovskiy precast plant" they receive the mass of flotation sludge, and further process it to obtain ash that comes to the production departments of the plant and to external consumers. The project envisages electricity consumption using the installation LIV-300-AIN-36.

According to the baseline production, i.e. production of ash under old technology - drying, required the use of natural gas for high-temperature drying of sludge, and additional use of electric power for the operation of the drying and ball mills which crushed ash to the required fraction. Also coal that was found in the sludge oxidized, thus causing more emissions into the atmosphere. It should be noted that for the generation of electricity they have burnt appropriate fuel used for thermal power plants, which led to GHG emissions into the atmosphere. Thus, under the JI of the project volume of emissions will decrease beyond the project activities.

The table below demonstrates all the emission sources under the baseline and project scenario. The project boundaries are outlined in line with the provisions of Article 13, 14 of JISC Guidance.

Table 22: Emissions sources demonstration

	Source	Gas	Included/Excluded	Justification/Explanation
Baseline scenario	Natural gas combustion	CO_2	Included	Main emission source of the coal sludge drying process.
	Carbon oxidation	CO_2	Included	Main emission source of the coal sludge drying process.
	Electric power consumption	CO_2	Included	Main emission source of the dry technology production process.
Project scenario	Electric power used for ash production prices provision	CO_2	Included	Main emission source of the wet technology production process.

Baseline scenario

The baseline scenario is a continuation of the existing situation. The need for ash is provided by high drying and ball mills. Such production requires the use of additional quantities of energy products. The emission sources included into the project boundaries under the baseline scenarios are as follows:

- carbon dioxide emissions from the combustion of natural gas in high drying installations;
- carbon dioxide emissions resulting from electricity consumption by ball mill and drying installations from electric power network of Ukraine;
- emissions of carbon dioxide by the oxidation of carbon contained in the sludge at high temperature drying.

Project scenario

The project envisages the production of ash by wet grinding technology of sludge and the rejection of the traditional method of producing ash. According to the project, it is planned to introduce a full-cycle of producing ash from slurry under wet grinding technology. Project goals: to reduce the use of coal flotation sludge, the use of natural gas to dry sludge and electricity.

The emission sources under project scenario are as follows:

- carbon dioxide emissions resulting from electricity consumption by the project plant from electric power network of Ukraine;

To demonstrate project boundaries and emission sources under the baseline and project scenarios the following figures are given:

Figure 3: Project boundaries under the baseline scenario

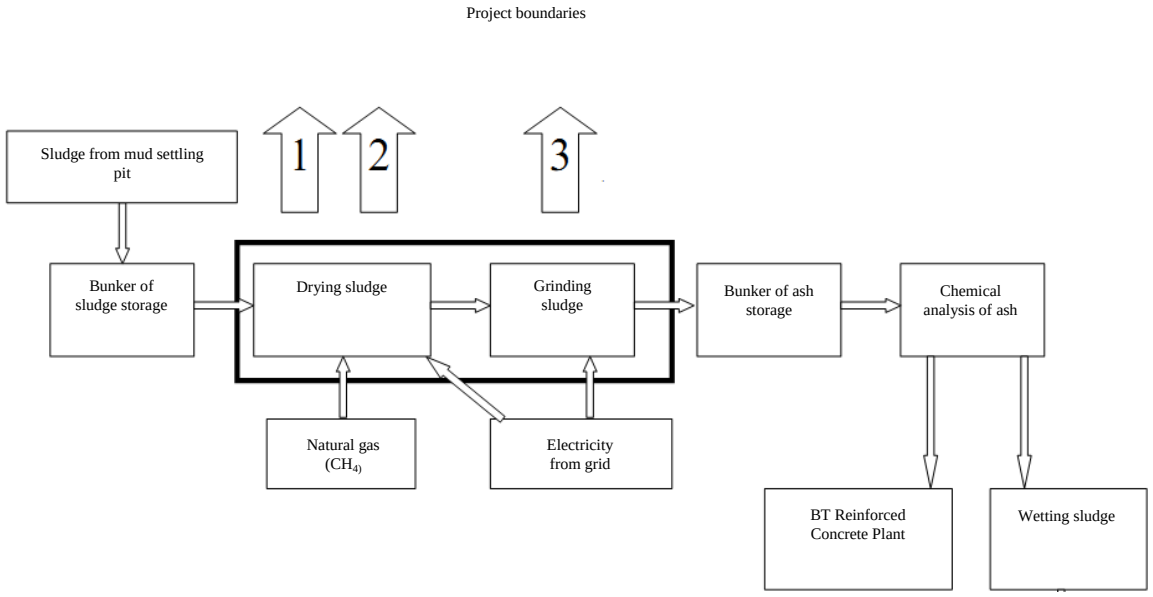

Figure 4: Project boundaries under the project scenario

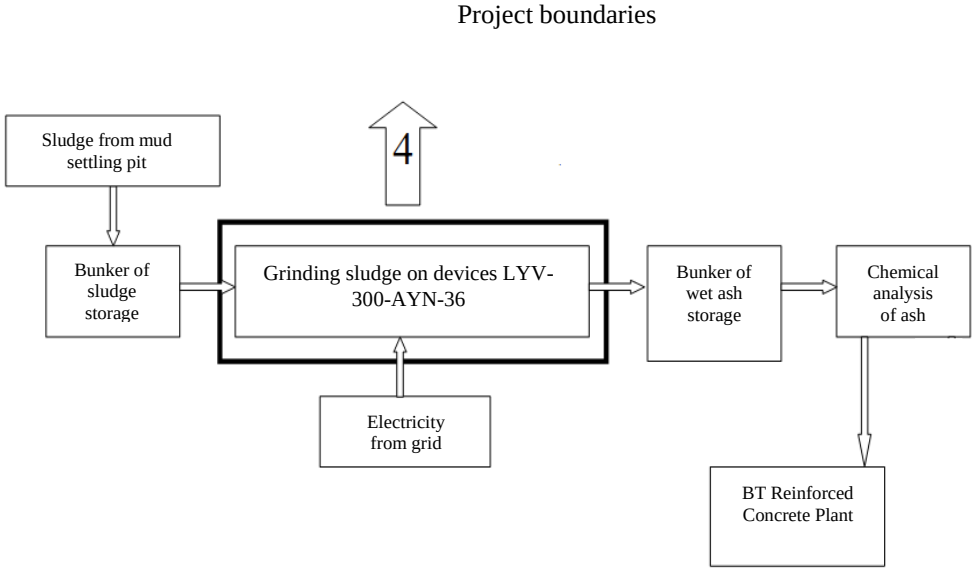

Figure 5: Scheme legend

Sources of greenhouse gas emissions on the schemes

1 - CO_2 emissions from the combustion of natural gas at units of high-temperature drying

2 - CO_2 emissions as a result of electricity consumption by drying unit from United Power Grid of Ukraine

3 - CO_2 emissions as a result of electricity consumption for grinding flotation sludge by ball mills from United Power Grid of Ukraine

4 - CO_2 emissions as a result of electricity consumption on devices LYV-300-AYN-36 under wet grinding technology from United Power Grid of Ukraine

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

Date of baseline setting: 13.09.2012

Name of a person/institution setting the baseline:

The baseline was set by Fa.Ro Srl Company. Fa.Ro Srl Company is not a project participant

Contact information:

Company	
Company name:	Fa.Ro Srl
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SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Starting date of the project is 11 September 2007 – start of the preparatory work of the implementation of technological scheme of ash production. This date is considered to be the starting date of JI Project.

C.2. Expected operational lifetime of the project:

Operational lifetime of the project will last till the end of 2026. Thus the operational lifetime of the project will be 19 years or 228 months.

C.3. Length of the crediting period:

Start of the crediting period: 01.01.2008.
End of the crediting period: 31.12.2026
Length of the crediting period: 19 years or 228 months.

Including:

- Length of the part of the crediting period within the first commitment period under the Kyoto Protocol: 5 years or 60 months (from 01.01.2008 till 31.12.2012)
- Length of the part of the crediting period after the first commitment period under the Kyoto Protocol – 14 years or 168 months (from 01.01.2013 till 31.12.2026).

Starting date of generation of emission reductions: 01.01.2008 – the start of exploitation of LYV-300-AYN-36 in operation.

Emission Reduction Units received after the first commitment period can be used according to the relevant mechanism within UNFCCC. The crediting period can be prolonged or extended beyond 2012 under the condition of the Host Party approval.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

Description of the monitoring plan chosen is made with the use of the following step-wise approach:

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

Option *a,* which is described in the document "Guidelines for Users of the Implementation Project Design Document Form", version 04[30] is used. Project participants decided to select an approach for baseline setting and monitoring developed in accordance with appendix B of the JI guidelines (JI-specific approach) in accordance with paragraph 9 (a) of the "Guidance on criteria for baseline setting and monitoring" (version 03) in this project.

Monitoring plan includes the following components:

1. *Collection and archiving of all relevant data necessary for estimating or measuring anthropogenic emissions from GHG sources occurring within the project boundaries during the crediting period:*

   For conducting data monitoring under the project clear and reliable structure of distribution of responsibilities will be created as well as relevant departments at the enterprise will be identified. Prepared departments' employees will collect and archive all relevant data in form of technical reports and statistic documents. Data from monitoring will be saved in electronic and paper format and will be stored not less than 2 years after the last transfer of Emission Reduction Units (ERUs).

2. *Collection and archiving of all relevant data necessary for determining of the baseline level of anthropogenic emissions from GHG sources by sources of GHG's occurring within the project boundary boundaries during the crediting period:*

   Technical reports, acts of weighing products, laboratory measurements and calculations will be used for collection of this information. Data from monitoring will be saved in electronic and paper format and will be stored not less than 2 years after the last transfer of Emission Reduction Units (ERUs).

3. *Identification of all potential sources as well as collection and archiving of data on increased anthropogenic emissions from GHG sources outside the project boundaries that are significant and can be reasonably attributed to the project during the crediting period:*

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

During the project activity no leakage is expected. The only source of greenhouse gases emissions which is outside the project boundaries and concerns the project activity is electric power plants, producing electric power by means of fuel combustion. This source is taken into account in the monitoring of GHG emissions by means of use of carbon dioxide emission factor during electric power consumption from Ukrainian electric grid which is calculated by Ukrainian DFP on annual basis, in particular, by the State Environmental Investment Agency of Ukraine or SEIA (former name - National Environmental Investment Agency of Ukraine, or NEIA).

4. *Quality assurance and control procedures for of the monitoring process:*

Conducting of regular verification/calibration of measurement equipment assures collected data to be precise and reliable. Regulations of conducting verifications/calibrations were adopted according to the passport data of the measurement equipment. To implement these measures regional representatives of the state metrological system of Ukraine together with energy department of the plant will be involved. In case if any defects of measurement equipment are revealed it will be substituted in accordance with sectoral standards of Ukraine. Technical condition of the measurement equipment will be controlled by the staff of the enterprise.

5. *Procedures for the periodic calculation of the reductions of anthropogenic emissions by sources according to the proposed JI project and leakage effects if any:*

During project realization process no leakage is expected outside the project boundaries. Implementation of the proposed project will allow reducing of electric energy consumption if compared to the situation which takes place under dry method of sludge grinding.
Calculation of these emissions will be determined by means of use of carbon dioxide emission factor during electric power consumption from the Ukrainian electric grid that is annually calculated by the Ukrainian DFP, namely by the State Environmental Investment Agency of Ukraine or SEIA (former name - National Environmental Investment Agency of Ukraine, or NEIA). Other emission sources in the baseline scenario are not taken into account for conservative calculations.

Step 2. Application of the approach chosen

Key factors influencing emissions level under the project and under the baseline scenario were taken into account and described in details in section B.1. Project activity will include monitoring of GHG emissions in the project and baseline scenarios. The detailed information as for emissions sources in the project and baseline scenarios is given below. Data concerning monitoring of GHG emissions will be archived in a proper way and stored during 2 years after the last ERUs' transfer.

Baseline scenario

Baseline scenario is a continuation of current situation. The necessary ash is received by means of old technology by dry method of grinding with the use of high-temperature dryers and ball mills. This leads to consumption of additional amounts of natural gas and electric power by the plant, which results in carbon emissions into the atmosphere. Emission sources under the baseline scenario within the project boundaries are:

- carbon dioxide (CO_2) emissions from natural gas combustion in high-temperature dryers;

- carbon dioxide (CO_2) emissions from consumption of electric power from electric grid of Ukraine by dryer and ball mills;
- carbon dioxide (CO_2) emissions in the baseline scenario from carbon oxidation in sludge.

Project scenario

Due to the project activity (application of wet method at LYV installations), natural gas use is excluded as well as electric power consumption is reduced in comparison with wet method of ash production. Project installation LYV-300-AYN-36 uses electric power for is work from the grid. The received ash is intended to meet the needs of the plant production.

Emission sources under the project scenario are:

- Carbon dioxide emissions connected to electric power consumption by the project equipment.

GHG emissions from electric power consumption are calculated using national emission factors for energy producing stations.

Emission reductions resulting from this project implementation will come from these main sources:

- Removal of source of greenhouse gases emissions resulting from the complete exclusion of natural gas consumption from the technological process of ash production;
- Removal of emissions from carbon oxidation during high-temperature sludge drying;

Data concerning the following parameters for any monitoring period should be collected and registered:

1. **Electric power consumption for ash production in the project scenario in period *y***

   To measure this parameter the company's financial data are used. Also monthly bills for electric power are available. This parameter is registered with the help of special electric meters. The meter is installed directly behind the current transformers in the place of project implementation. This meter registers all the electric power consumed within the project boundaries as access to the electric grid is performed through it. The registrations are used for commercial payments to the company supplying electric power. Regular cross-checks with the company supplying electric power are conducted as well. Monthly reports which are further used in the resume of annual reports on installation work are prepared on the basis of these data.

2. **Ash production in period y.**

   Company's financial data are used to determine this parameter. To confirm fraction amount (0-45 microns) delivery and acceptance certificates, products weighing certificates and other documents from consumers are used. Only production that was delivered to the external consumers and to Bilotserkivsky plant is taken into account and related to the activity under the project to calculate GHG emission reductions. Weighing takes place on the industrial site of Bilotserkivsky plant next to the shop of sludge processing with the help of special scales. For transparency and accuracy of calculation of this parameter regular cross-checks are conducted together with ash

receivers at plant and departments of external consumers. On the basis of daily ash production delivery and acceptance certificates monthly and annual technical reports are prepared.

Fixation of these parameters is provided within boundaries of technological accounting of the work of LYV units. Constant monitoring and control of these parameters satisfy ordinary economic interests of the enterprise.

Coefficients, specific values and other parameters which are taken according to the data of third-party sources and periodically updated will be also periodically determined and registered for monitoring purposes. Detailed information will be presented in PDD.

Data and parameters which were not monitored during the whole crediting period and are determined just once (and remain unchanged during the whole crediting period) and are available at the stage of PDD determination are presented in the table below:

Table 23: List of constants used for emission calculations

Data / Parameter	***Measurement unit***	***Description***	***Data source***	***Value***
$SMC_{BL,Slag}$	t of sludge /t of ash	Specific consumption of sludge for production of ash in baseline scenario	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process	2
$SFC_{BL,NG}$	m^3/t	Specific consumption of natural gas for production of ash in baseline scenario	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process	30
$C_{BL,Slag}$	fraction	Mass fraction of carbon in the sludge in baseline scenario that is oxidized	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process	0.16

$NCV_{NG,y}$	TJ/m^3	Net calorific value of natural gas in period y	National Inventory Report in Ukraine for 1990-2010 pages 456, 462, 468[31] (1.A.2.f – Other sectors of Industry and Construction). Value is converted from GJ/1000 m^3 to TJ/m^3	0.000034
$C_{NG,y}$	t C/TJ	Carbon content in natural gas in period *y*	National Inventory Report in Ukraine for 1990-2010 pages 458, 464, 470[32] (1.A.2.f – Other sectors of Industry and Construction).	In 2008 – 15.17 In 2009 – 15.2 In 2010 and later on – 15.17
$OXID_{NG,y}$	fraction	Coefficient of carbon oxidation in baseline scenario (for natural gas) in period *y*	National Inventory Report in Ukraine for 1990-2010 pages 459, 465, 471[33] (1.A.1.a – Electricity and Heat Production)	In 2008 – 0.995 In 2009 – 0.995 In 2010 and later on – 0.995
$OXID_{BL,y}$	fraction	Coefficient of carbon oxidation in baseline scenario (for coal)in period *y*	National Inventory Report in Ukraine for 1990-2010 pages 459, 465, 471[34] (1.A.1.a Electricity and Heat Production)	In 2008 – 0.963 In 2009 – 0.963 In 2010 and later on – 0.962
$SEC_{BL,Ash}$	MWh/t of ash	Specific consumption of electricity for production of ash in baseline scenario	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during	0.00447

[31] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[32] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[33] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[34] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

			determination process	
$EF_{EL,grid,y}$	tCO_2/MWh	Specific indirect carbon dioxide emission factor from electricity consumption by the 2nd class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052 in period *y*, tCO_2/MWh	In 2008 - Order of the National Environmental Investment Agency # 62 dated 15.04.2011[35]	1.219
			In 2009 - Order of the National Environmental Investment Agency # 63 dated 15.04.2011[36]	1.237
			In 2010 - Order of the National Environmental Investment Agency # 43 dated 28.03.2011.[37]	1.225
			In 2011 and later on - Order of the National Environmental Investment Agency #75 dated 12.05.2011.[38]	1.227

Data and parameters which are not monitored during the whole crediting period and are determined just once (and remain unchanged during the whole crediting period) but which are not available at the stage of determination

There are no such parameters in the monitoring plan of this project.

Data and parameters which are monitored during the whole crediting period:

These data are presented in the table below:

[35] http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[36] http://www.neia.gov.ua/nature/doccatalog/document?id=127172
[37] http://www.neia.gov.ua/nature/doccatalog/document?id=126006
[38] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

Table 24: Data and parameters which are monitored during the whole crediting period

Data / Parameter	***Measurement unit***	***Description***	***Data source***
$EC_{Ash,y}$	MWh	Electricity consumption for production of ash in project scenario in period y	This parameter is registered by specialized electric meter
$P_{Ash,y}$	t	Ash production in period y	Commercial and technical data are used to measure this parameter. This parameter is registered with the help of special scales.

Measurement devices

Measurement of some parameters which are monitored in this project is performed in the following way:

- The amount of electric power consumed in the project activity is measured with the help of special meter which is a multifunctional device for measurement of the electric power consumed by the shop of ash production. This device is calibrated according to the technical characteristics and national standards of Ukraine. In case of any deviations in electric meter data it will be replaced by other device. Exact type, accuracy class and calibration period for electricity meter will be mentioned in the periodic monitoring report for each device. Typical electricity meters in Ukraine are electronic electricity meters of 0,5s accuracy class. Calibration period for such devices in Ukraine typically is 6 years.

- The amount of ash produced from flotation sludge under the technology of wet grinding in LYV installations is measured with the help of special scales. The control of these scales functionality is performed periodically in accordance with technical characteristics of the device and national standards. Exact type, accuracy class and calibration period for scales will be mentioned in the periodic monitoring report for each device. Typical scales that are used for such purposes in Ukraine are automobile strain scales with accuracy class varying according to maximum allowed measurement. Calibration period for such devices in Ukraine typically is 1 year.

Calibration of measurement devices and equipment

Calibration of measurement devices will be held periodically according to technical regulations of the Host Party. Calibration should be performed by authorized representatives of the State Metrological Service of Ukraine, for example SE “Kyivoblstandardmetrologiya” located in Bila Tserkva.

Exact entity conducting the calibration for the specified period will be mentioned in periodic monitoring reports that will be submitted for verification to AIE.

Correspondence of monitoring procedures to the standards in the sector

Used monitoring procedure corresponds to standard procedures for such kind of activity and widespread practice in the sector. Monitoring organization was integrated and divided among workers of the plant. All the procedures of data collection, their treatment, archiving and actions during unusual or emergency cases were given to relevant persons.

Approach to monitoring in this project totally corresponds to standard processes in production and includes monitoring of ash amount which is produced from flotation sludge, and volume of electric power consumed in the project. Additional monitoring parameters serve for improvement of monitoring accuracy and correspond to the approach applied to the baseline and monitoring determination in the project.

Data archiving, storage and documents turnover procedure

Documents and reports with data which should be monitored will be archived and stored by the project participants. The documents to be stored are as follows: primary accounting documents as for parameters to be monitored, in paper; interim reports, orders, technical reports and other documents on monitoring in paper and electronic format; documents on measurement devices in paper and electronic format. This documentation and other data of monitoring necessary for determination and verification as well as any other data to be monitored and necessary for verification should be stored during two years form the last ERUs' transfer within the project. If expected for monitoring data on ash production are unavailable (which are used for calculation of baseline emission s and leakage) they will not be considered and emission reductions will not be taken into account. If data parameters used for project emissions calculations - electric power consumption - are absent, average specific data on consumption for previous periods will be used. This is conservative.

Training of personnel performing monitoring

Technology that requires skills and knowledge on heavy equipment, ash production equipment and electrical equipment exploitation will be used in the project. Acquirement of necessary skills and knowledge is provided by the local system of vocational education and training. In Ukraine this system is supervised by the State. Employees receive a standard certificate in the sphere of vocational education after having graduated from vocational school. Workers with appropriate qualification can be allowed to work with such industrial equipment. Management of the enterprise where the project is implemented should provide relevant level of personnel training which will allow them working with this equipment. Rules of work with new equipment will be provided to the staff by supplier of the installation for further exploitation of new equipment. The supplier will also provide primary control over the complex work.

Safety training is obligatory and should be conducted for the whole project personnel according to the demands of local legislation. Safety training procedure includes training area, training terms, training forms, examinations. The management of the enterprise where the project is implemented should provide making registration notes of this training and periodical examinations.

Activity which is directly connected to the monitoring process does not require any special knowledge except for those related to the sphere of professional studying. Thus personnel responsible for monitoring process will have relevant training on monitoring procedures and requirements. It also will have studying and consultancies on Kyoto Protocol, JI Projects and monitoring provided by the project consultant - Fa.Ro Srl. Company.

Procedures identified for correction actions aimed at provision of more accurate monitoring process and reporting in future

In cases of any mistakes, inaccurate actions or contradictions which will be identified in the monitoring process by the management of the enterprise where the project is implemented, there will be assigned special commission which will investigate such cases and issue an order which will include regulations as for necessary correction actions which should be implemented and will help avoid such situations in future.

Management of the enterprise where the project is implemented should establish a communication channel which will enable any person related to the monitoring process to make suggestions, improvements and ideas for more accurate monitoring process in future. All the suggestion will be addressed to the top management of the enterprise which is obliged to consider all these suggestions and in case of necessity implement necessary correction measures and improvements. Project consultant, Fa.Ro Srl Company, will perform periodical analysis of the monitoring plan and procedures and if necessary will suggest to other participants relevant improvements.

Procedures to be implemented in case if expected data from any source will be unavailable.

For data and parameters which are not monitored during the whole crediting period and are determined just once (and remain unchanged during the whole crediting period) and which are available or unavailable at the stage of PDD determination, indexes stated in PDD are taken. If updated data are unavailable the last and most accurate data (e.g. previous period data) are applied to.

For data and parameters which are monitored during the whole crediting period standard procedures in this sector are applied to every data type. For example cross-checks with energy resources suppliers and production (ash) consumers, receiving calculated values, averaging etc. In every case the change of data receiving method will be registered and reflected in the monitoring report.

Emergency readiness in cases when an emergency situation can cause unexpected emissions

Project activity does not provide any factors or cases of emergency which can result in unexpected GHG emissions. The safety of equipment and personnel operation is provided by systematic conduction of safety instruction. Procedure in cases of emergency such as fire, serious equipment failure, etc. is designed as an obligatory part of regulations for doing business according to the valid legislation.

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

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	$EC_{Ash,y}$ – Electricity consumption for production of ash in project scenario in period *y*	Company's notes, electric meters	MWh[39]	m/c	Continuous measurement Monthly reports.	100%	Electronic and paper	This parameter is registered by specialized electric meter
2	$EF_{EL,grid,y}$ - Specific indirect carbon dioxide emission factor from electricity consumption by the 2nd class electricity consumers according to the	See Section D.1.	tCO_2e/ MWh	e	Fixed ex-ante	100%	Electronic	The values are provided by DFP of Ukraine. Data are available at the project

[39]Data from the meters come in kWh. For convenience of calculations, this parameter is presented in MWh

	Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052 in period *y,* tCO_2/MWh.							determination moment.

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

Calculations results are presented in metric tons of carbon dioxide equivalent (CO_2e), one metric ton of carbon dioxide equivalent equals to 1 metric ton of carbon dioxide (CO_2), thus 1t CO_2e = 1t CO_2.
Emissions in the project scenario are calculated as follows:

$$PE_y = PE_{EL,y}, \quad \textit{(Equation 5),}$$

where:

$PE_{EL,y}$ - GHG emissions in project scenario from electricity consumption in period *y,* tCO_2e.

GHG emissions in project scenario from electricity consumption are in turn calculated as follows:

$$PE_{EL,y} = EC_{Ash,y} \times EF_{EL,grid,y}, \quad \textit{(Equation 6),}$$

where:

$EC_{Ash,y}$ – Electricity consumption for production of ash in project scenario in period *y*, MWh;

$EF_{EL,grid,y}$ - Specific indirect carbon dioxide emission factor from electricity consumption by the 2nd class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052 in period *y,* tCO_2/MWh

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
1	$P_{Ash,y}$ - Ash production in period y	Company records	t	m/c	Each party is constantly measured	100%	Electronic and paper	Commercial and technical data are used to measure this parameter. This parameter is registered with the help of special scales.
2	$SMC_{BL,Slag}$ – Specific consumption of sludge for production of ash in baseline scenario, t/t;	Company records	t/t	m/c	Fixed ex-ante	100%	Electronic	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process

3	$SFC_{BL,NG}$ – Specific consumption of natural gas for drying sludge to produce ash, m^3/t;	Company records	m^3/t	m/c	Fixed ex-ante	100%	Electronic	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.
4	$NCV_{NG,y}$ – Net calorific value of natural gas in period y	National Inventory Report in Ukraine for 1990-2010 pages. 456, 462, 468[40] (1.A.2.f – Other sectors of Industry and Construction).	TJ/m^3	e	Fixed ex-ante	100%	Electronic	Values were transformed from $GJ/1000\ m^3$ to TJ/m^3.

[40] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

5	$C_{NG,y}$ – carbon content in natural gas in period y	National Inventory Report in Ukraine for 1990-2010 pages 458, 464, 470[41] (1.A.2.f – Other sectors of Industry and Construction).	t C/TJ	e	Fixed ex-ante	100%	Electronic	Latest available data are used.
6	$OXID_{NG,y}$ - Coefficient of carbon oxidation for natural gas in period y	National Inventory Report in Ukraine for 1990-2010 pages 459, 465, 471[42] (1.A.1.a – Electricity and Heat Production)	fraction	e	Fixed ex-ante	100%	Electronic	Latest available data are used.

[41] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[42] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

7	$C_{BL,Slag}$ - Mass fraction of carbon in the sludge in baseline scenario that is oxidized	Company records	Fraction	m/c	Fixed ex-ante	100%	Electronic	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.
8	$OXID_{BL,y}$ – Coefficient of carbon oxidation in baseline scenario (for coal) in period y	National Inventory Report in Ukraine for 1990-2010 pages 459, 465, 471[43] (1.A.1.a – Electricity and Heat Production)	fraction	e	Fixed ex-ante	100%	Electronic and paper	The latest specific data for the country. Data are available at the moment of determination

[43] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

9	$SEC_{BL,Ash}$ – Specific consumption of electricity for production of ash in baseline scenario	Company records	MWh/t	m/c	Fixed ex	100%	Electronic	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.

10	$EF_{EL,grid,y}$ - Specific indirect carbon dioxide emission factor from electricity consumption by the 2nd class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052 in period *y,* tCO_2/MWh	See Section D.1.	tCO_2/MWh	e	Fixed ex-ante	100%	Electronic	The values are provided by DFP of Ukraine. Data are available at the project determination moment.

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

Emissions[44] under the baseline scenario are calculated as follows:

$$BE_y = BE_{FC,y} + BE_{CO,y} + BE_{EL,y} \quad \textit{(Equation 7),}$$

[44] Calculation results are provided in metric tons of CO_2-eq., i.e. 1 tCO_2-eq. = 1 tCO_2.

where:
$BE_{FC,y}$ - GHG emissions in baseline scenario from natural gas consumption for drying sludge in period *y*, tCO_2e;
$BE_{CO,y}$ - GHG emissions in baseline scenario from carbon oxidation in the sludge in period *y*, tCO_2e;
$BE_{EL,y}$ - GHG emissions in baseline scenario from electricity consumption in period *y*, tCO_2e

GHG emissions in baseline scenario from natural gas consumption for drying sludge are in turn calculated as:

$$BE_{FC,y} = P_{Ash,y} \times SMC_{BL,Slag} \times SFC_{BL,NG} \times NCV_{NG,y} \times C_{NG,y} \times OXID_{NG,y} \times \frac{44}{12} \quad \textit{(Equation 8),}$$

where:
$BE_{FC,y}$ - GHG emissions in baseline scenario from natural gas consumption for drying sludge in period *y*, tCO_2e;
$P_{Ash,y}$ – Production of ash in period *y*, t;
$SMC_{BL,Slag}$ – Specific consumption of sludge for production of ash in baseline scenario, t/t;
$SFC_{BL,NG}$- Specific consumption of natural gas for drying sludge to produce ash, m^3/t;
$NCV_{NG,y}$ – Net calorific value of natural gas, GJ/m^3;
$EF_{NG,y}$ – GHG emission factor during natural gas combustion in period *y*, tCO_2e /GJ.
$C_{NG,y}$ – Carbon content in natural gas in period *y*, t C/TJ;
$OXID_{NG,y}$ - Coefficient of carbon oxidation in baseline scenario (for natural gas) in period *y*, fraction;
$44/12$ – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2.

GHG emissions in baseline scenario from carbon oxidation in the sludge are in turn calculated as follows:

$$BE_{CO,y} = P_{Ash,y} \times SMC_{BL,Slag} \times C_{BL,Slag} \times OXID_{BL,y} \times 44/12, \quad \textit{(Equation 9),}$$

where:

$BE_{CO,y}$ - GHG emissions in baseline scenario from carbon oxidation in the sludge in period *y*, tCO_2e;
$P_{Ash,y}$ – Production of ash in period *y*, t;
$SMC_{BL,Slag}$ – Specific consumption of sludge for production of ash in baseline scenario, t/t;
$C_{BL,Slag}$ - Mass fraction of carbon in the sludge in baseline scenario that is oxidized, fraction;
$OXID_{BL,y}$ – Coefficient of carbon oxidation in baseline scenario (for coal) in period *y*, coefficient;
$44/12$ – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2.

GHG emissions from electricity consumption are in turn calculated as follows:

$BE_{EL,y} = P_{Ash,y} \times SEC_{BL,Ash} \times EF_{EL,grid,y}$, *(Equation 10),*

where:

$BE_{EL,y}$ - GHG emissions in baseline scenario from electricity consumption in period *y*, tCO_2e;
$P_{Ash,y}$ – Production of ash in period *y*, t;
$SEC_{BL,Ash}$ – Specific consumption of electricity for production of ash in baseline scenario, MWh/t;
$EF_{EL,grid,y}$ - Specific indirect carbon dioxide emission factor from electricity consumption by the 2nd class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052 in period *y,* tCO_2/MWh

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:

Activity realized within the project does not result in any leakage

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

Not applicable.

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

Not applicable.

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):

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y, \qquad \textit{(Equation 11)}$$

where:

ER_y - GHG emission reductions in period y, tCO_2e
BE_y - GHG emissions in baseline scenario in period y, tCO_2e;
PE_y - GHG emissions in project scenario 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:

Any negative effect on the environment as a result of the project implementation is absent. Therefore, the Host Party's requirements are not applicable.

Collection and storage of information on project impact on the Environment will be performed on the basis of adopted EIA according to the legislation of the Host Party – *State construction norms DBN A.2.2.-1-2003: "Structure and Content of Environment Impact Assessment (EIA) for the design and construction of enterprises, buildings and structures",* State Committee of Ukraine for 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. – ID 1	Low	The electricity meters are calibrated in accordance with the procedures of the Host Party. Calibration interval is 6 years.
D.1.1.1. – ID 2	Low	Specific carbon dioxide emissions from electrical energy production by thermal power plants connected to the United Energy System of Ukraine are calculated by DFP of Ukraine on periodic basis. Latest factors will be applied to the Monitoring Reports.
D.1.1.3. – ID 1	Low	This parameter is used in the technical accounting at the enterprise and is determined continuously. Involved measuring equipment will undergo periodic calibration according to the Legislation of Ukraine.
D.1.1.3. – ID 2,3,7,9	Low	Data are taken from the technical reports provided by service of operation and maintenance Shop of ash preparation, which is a part of the plant. Technical reports will be provided to the AIE during the determination process.
D.1.1.3. – ID 4-6, 8	Low	Latest available official data are used.

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

Project owner, which will implement this monitoring plan, regulations in the structure of the organization and quality control is PJSC "Belotserkovskiy precast plant". Management led by Director of the company is responsible for monitoring fulfilment, monitored data collection, registration, visualizing, storage, reporting and periodical testing of measurement devices. Detailed structure of management of the company will be determined in the monitoring Report before primary and first verification. Key structure is presented in the chart below:

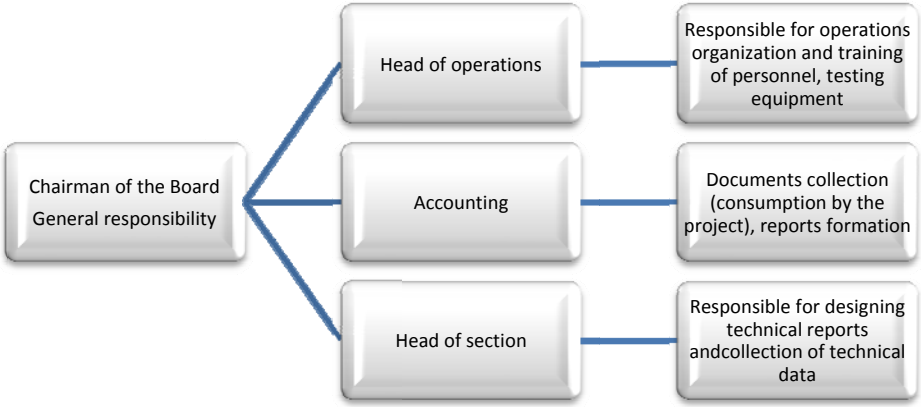

Figure 6: Monitoring chart.

The project provides the following management system:
Head of the Executive Board of PJSC "Belotserkovskiy precast plant" bears general responsibility for monitoring and project activity realization. Deputy Director is directly responsible for the organization of work at the site. He coordinates all the issues as for installation exploitation, repairs, modernization, etc. Head of operations is responsible for proper fulfilment of safety measures and timely personnel training. Head of section performs technical data monitoring (electricity, sludge consumption, ash supply, etc.) for designing technical reports, and ensures the proper maintenance and construction works on the project installation. All the project information on resources consumption or production volumes is delivered to the accounting department. This department accumulates necessary information as for electricity consumption, volumes of flotation sludge processing and ash production. On the basis of these data technical reports and accounting documents are formulated. Management system is well arranged that promotes safe and accurate data collection and identification.

Internal audits will be performed if necessary during the monitoring periods. Results of such audits will be mentioned in the periodic monitoring reports.

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

Monitoring plan has been designed by PJSC "Belotserkovskiy precast plant", which is a project participant.

Contact information:

Company name:	Public Joint Stock Company "Belotserkovskiy precast plant"

Company address:	09113, Bila Tserkva, Sichnevy Proryv St., 39
Contact person	
Name:	Petryshyn Vasyl Ivanovych
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SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Formulae used for estimation of the project anthropogenic emissions by greenhouse gases sources, description of calculation according to these formulae and all the assumptions used were described in Section D.1.1.2.

Table 24: Expected project emissions during crediting period part during the first commitment period under the Kyoto Protocol

Project emissions	Measurement unit	2008	2009	2010	2011	2012	Total
GHG emissions from electricity consumption in the project scenario	tCO_2e	4745	4157	3784	4056	4422	**21164**
Total project emissions during crediting period	tCO_2e	4745	4157	3784	4056	4422	**21164**

Table 25: Expected project emissions during crediting period part after the first commitment period under the Kyoto Protocol

Project emissions	Measurement unit	2013-2026 Annual emissions	Total
GHG emissions from electricity consumption in the project scenario	tCO_2e	4991	**69874**
Total project emissions after the crediting period	tCO_2e	4991	**69874**

E.2. Estimated leakage:

No leakage sources were identified.

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

Table 26: Expected project emissions during crediting period part during the first commitment period under the Kyoto Protocol

Total project emissions during the crediting period	Measurement unit	2008	2009	2010	2011	2012	Total
	tCO_2e	4745	4157	3784	4056	4422	**21164**

Table 27: Expected project emissions during crediting period part after the first commitment period under the Kyoto Protocol

Total project emissions after the crediting period	Measurement unit	2013 - 2026 Annual emissions	Total
	tCO_2e	4991	**69874**

E.4. Estimated baseline emissions:

Table 28: Estimated baseline emissions during crediting period part during the first commitment period under the Kyoto Protocol

Baseline emissions	Measurement unit	2008	2009	2010	2011	2012	Total
GHG emissions from natural gas consumption for sludge drying in the baseline scenario in period *y*	tCO_2e	77791	67287	61732	66049	72022	**344 881**
GHG emissions from carbon oxidation in sludge in the baseline scenario in period *y*	tCO_2e	778515	672065	617154	660317	720027	**3 448 078**
GHG emissions from electricity consumption in the baseline scenario in period *y*	tCO_2e	3754	3289	2994	3209	3499	**16 745**
Baseline emissions during the crediting period	tCO_2e	860060	742641	681880	729575	795548	**3 809 704**

Table 29: Estimated baseline emissions during crediting period part after the first commitment period under the Kyoto Protocol

Baseline emissions	Measurement unit	2013 - 2026 Annual emissions	Total
Baseline emissions in the baseline scenario resulted from combustion of waste dump	tCO_2e	81291	**1 138 074**
GHG emissions from carbon oxidation in sludge in the baseline scenario in period *y*	tCO_2e	812698	**11 377 772**
GHG emissions from electricity consumption in the baseline scenario in period *y*	tCO_2e	3949	**55 286**
Baseline emissions after the crediting period	tCO_2e	897938	**12 571 132**

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

Table 30: Estimated emission reductions during crediting period part during the first commitment period under the Kyoto Protocol

Emission reductions during the crediting period	Measurement unit	2008	2009	2010	2011	2012	Total
	tCO_2e	855315	738484	678096	725519	791126	**3 788 540**

Table 31: Estimated emission reductions during crediting period part after the first commitment period under the Kyoto Protocol

Emission reductions after the crediting period	Measurement unit	2013 - 2026 Annual emission reductions	Total
	tCO_2e	892947	**12 501 258**

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

Table 32: Estimated emissions balance within the proposed project during crediting period part during the first commitment period under the Kyoto Protocol

Year	Estimated project emissions (tCO_2e)	Estimated leakage (tCO_2e)	Estimated baseline emissions (tCO_2e)	Estimated emission reductions (tCO_2e)
2008	4745	0	860060	855315
2009	4157	0	742641	738484
2010	3784	0	681880	678096
2011	4056	0	729575	725519
2012	4422	0	795548	791126
Total tCO_2e	**21164**	0	**3 809 704**	**3 788 540**

Table 33: Estimated emissions balance within the proposed project during crediting period part after the first commitment period under the Kyoto Protocol

Year	Estimated project emissions (tCO_2e)	Estimated leakage (tCO_2e)	Estimated baseline emissions (tCO_2e)	Estimated emission reductions (in tones of CO_2 equivalent)
Year 2013	4991	0	897938	892947
Year 2014	4991	0	897938	892947
Year 2015	4991	0	897938	892947
Year 2016	4991	0	897938	892947
Year 2017	4991	0	897938	892947

Year 2018	4991	0	897938	892947
Year 2019	4991	0	897938	892947
Year 2020	4991	0	897938	892947
Year 2021	4991	0	897938	892947
Year 2022	4991	0	897938	892947
Year 2023	4991	0	897938	892947
Year 2024	4991	0	897938	892947
Year 2025	4991	0	897938	892947
Year 2026	4991	0	897938	892947
Total tCO_2e	**69874**	0	**12571132**	**12501258**

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:

All measures under the project do not involve any negative impacts on the environment, so EIA specifically for this project was not developed.

The project in no way has transboundary impact, as it is implemented in the territory of Belotserkovskiy precast plant, Bila Tserkva, Kyiv region in Ukraine and does not include any impact that may occur in the territory of another state.

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[45] (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 from mud settling pit and reconstruction of technological process at the enterprises 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:

- Impact on atmospheric air: according to the proposed activity of the point of processing coal and rock mass into the atmospheric air dust coal and gaseous emissions are not emitted. On the boundary of the nearest residential area pollution of the surface of atmospheric layer, as well as total dust including background air pollution do not exceed the maximum permissible concentration;
- There is no impact on the water. Project activity of the ash production will not affect the superficial and underground (ground) water because there are no sources of such pollution. Project equipment and technology of ash production by wet grinding method excludes resetting technical water or sludge in reservoirs. Water used for household needs on-site, is delivered by existing water supply systems;
- 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;
- There is no 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 project activity reduces harmful emissions into the atmosphere through the exclusion of high temperature drying sludge. All necessary measures are provided by working project, they are directed to protecting of staff from possible negative impact in accordance with sanitary standards.

[45] *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. 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.

No comments were received.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organization:	Public Joint Stock Company "Belotserkovskiy precast plant"
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E-mail:	zbk@zbk.com.ua
URL:	-
Represented by:	Petryshyn Vasyl Ivanovych
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Salutation:	Mr.
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Annex 2

BASELINE INFORMATION

Data for calculations and forecasts

The date of the baseline setting in this PDD is 13/09/2012. Therefore the calculations of emission reduction estimates for the period of 2008-2012 follow the actual data on project performance during the given period. The emission reductions in this project directly depend on the production of ash by the plant. Fluctuation in numbers follows the fluctuation in the general output at the plant as the production of ash depends on the concrete products production levels and external demand. As the Ukrainian economy experienced the outbreak of the global economic crisis in 2008-2009 all sectors and construction sector even more than others were subject to a decline. That is reflected in the declining production figures in 2009 and 2010. In 2011 and onwards the industry has seen recovery and growth with many big infrastructure projects being launched in Ukraine. In turn this has had an impact on the production level of concrete products and in turn on the production level of ash. Calculations of emission reduction estimates for future periods (2013 and onwards) are based on the assumption of full load of production capacities.

Tables that contain the basic elements of the baseline

Ash amount produced with the use of wet method of sludge grinding

Data/Parameter	$P_{Ash,y}$
Data unit	t
Description	Ash production in period *y*
Demonstration/monitoring term	Should be periodically monitored
Data source (to be) used	Project owner documentation. Data of weighting point.
Values of data applied (for expected calculations/definitions)	Provided by project owner
Justification of data choice or description of methods and procedures of measurements (to be) applied	Measured during ash shipment to the production site. On-site measurement for commercial purposes
Procedures of quality providing/control (to be) applied	According to the entire policy of the project owner
Comments	No

Specific sludge consumption for ash production in the baseline scenario

Data/Parameter	$SMC_{BL,Slag}$
Data unit	t/t
Description	Specific sludge consumption for ash production in the baseline scenario
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation

	shop included in the plant structure. Technical reports will be provided to AIE during determination process.
Values of data applied (for expected calculations/definitions)	Provided by the project owner. See. Table 7.
Justification of data choice or description of methods and procedures of measurements (to be) applied	Data adopted according to the technological documents of the project owner.
Procedures of quality providing/control (to be) applied	According to the entire policy of the project owner
Comments	No

Specific natural gas consumption for sludge drying for ash production

Data/Parameter	$SFC_{BL,NG}$
Data unit	m^3/t
Description	Specific natural gas consumption for sludge drying for ash production
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.
Values of data applied (for expected calculations/definitions)	Provided by the project owner. See Table 7.
Justification of data choice or description of methods and procedures of measurements (to be) applied	Data adopted according to the technological documents of the project owner.
Procedures of quality providing/control (to be) applied	According to the entire policy of the project owner
Comments	No

Net calorific value of natural gas

Data/Parameter	$NCV_{NG,y}$
Data unit	TJ/m^3
Description	Net calorific value of natural gas
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	National Inventory Report in Ukraine for 1990-2010, pages 456, 462, 468[46] (1.A.2.f – Other sectors of Industry and Construction). Values converted from GJ/ 1000 m^3 to TJ/m^3.
Values of data applied (for expected calculations/definitions)	0.000034

[46] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.
Comments	No

Carbon content in natural gas

Data/Parameter	$C_{NG,y}$
Data unit	t C/TJ
Description	Carbon content in natural gas in period *y*
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	National Inventory Report in Ukraine for 1990-2010, pages 458, 464, 470[47] (1.A.2.f – Other sectors of Industry and Construction)
Values of data applied (for expected calculations/definitions)	In 2008 – 15.17 In 2009 – 15.2 In 2010 and later on – 15.17
Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.
Comments	No

Coefficient of carbon oxidation for natural gas

Data/Parameter	$OXID_{NG,y}$
Data unit	fraction
Description	Coefficient of carbon oxidation in baseline scenario (natural gas)
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	National Inventory Report in Ukraine for 1990-2010, pages 459, 465, 471[48] (1.A.1.a – Electricity and heat production)
Values of data applied (for expected calculations/definitions)	0.995
Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.

[47] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php
[48] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

Comments	No

Mass fraction of carbon in the sludge in baseline scenario that is oxidized

Data/Parameter	$C_{BL,Slag}$
Data unit	fraction
Description	Mass fraction of carbon in the sludge in baseline scenario that is oxidized
Demonstration/monitoring term	monthly
Data source (to be) used	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.
Values of data applied (for expected calculations/definitions)	0.16
Justification of data choice or description of methods and procedures of measurements (to be) applied	Laboratory researches
Procedures of quality providing/control (to be) applied	According to national standards of measurement of carbon content in flotation sludge was performed in accordance with GOST 25818-91 "Thermal plant fly-ashes".
Comments	No

Coefficient of carbon oxidation in baseline scenario (for coal)

Data/Parameter	$OXID_{BL,y}$
Data unit	fraction
Description	Coefficient of carbon oxidation in baseline scenario (for coal) in period y
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	National Inventory Report in Ukraine for 1990-2010, pages 459, 465, 471[49] (1.A.1.a – Electricity and heat production)
Values of data applied (for expected calculations/definitions)	In 2008 – 0.963 In 2009 – 0.963 In 2010 and later on – 0.962
Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.
Comments	No

[49] http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/6598.php

Specific electric energy consumption for ash production in the baseline scenario

Data/Parameter	$SEC_{BL,Ash}$
Data unit	MWh/t
Description	Specific electric energy consumption for ash production in the baseline scenario
Demonstration/monitoring term	Fixed ex-ante
Data source (to be) used	Data were taken from the technical reports which were provided by the exploitation and maintenance department of the ash preparation shop included in the plant structure. Technical reports will be provided to AIE during determination process.
Values of data applied (for expected calculations/definitions)	0.00447
Justification of data choice or description of methods and procedures of measurements (to be) applied	Data were taken according to the technological documents of the project owner.
Procedures of quality providing/control (to be) applied	According to the entire policy of the project owner.
Comments	No

Specific indirect carbon dioxide emission factor from electricity consumption

Data/Parameter	$EF_{EL,grid,y}$	
Data unit	tCO_2/MWh	
Description	Specific indirect carbon dioxide emission factor from electricity consumption by the 2nd class electricity consumers according to the Procedure for determining the class of consumers, approved by the National Electricity Regulatory Commission of Ukraine from August 13, 1998 # 1052 in period *y*, tCO_2/MWh	
Demonstration/monitoring term	Fixed ex-ante	
Data source (to be) used	Orders of DFP of Ukraine.	
Values of data applied (for expected calculations/definitions)	In 2008 – Order of the National Environmental Investment Agency No.62 dated 15.04.2011[50]	1.219
	In 2009 – Order of the National Environmental Investment Agency No.63 dated 15.04.2011[51]	1.237
	In 2010 – Order of the National Environmental Investment Agency No.43 dated 28.03.2011[52]	1.225
	In 2011 and later on - Order of the	1.227

[50] http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[51] http://www.neia.gov.ua/nature/doccatalog/document?id=127172
[52] http://www.neia.gov.ua/nature/doccatalog/document?id=126006

	National Environmental Investment Agency No.75 dated 12.05.2011[53]	
Justification of data choice or description of methods and procedures of measurements (to be) applied	The latest available national data.	
Procedures of quality providing/control (to be) applied	Is taken according to the latest available national data.	
Comments	No	

[53] 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

Additional Information

Organization:	Public Joint Stock Company "Belotserkovskiy precast plant"
Country of registration:	Ukraine
EDRPOU code (Uniform State Register of Enterprises and Organizations of Ukraine):	00130659
KVED types of economic activities (Code of economic activities according to the general classification of economic activities)	26.61.0 Manufacture of concrete products for construction purposes□; 51.53.2 Wholesale of build materials.

Organization:	Amster Capital SCS
Country of registration:	Belgium
Data of registration:	06/05/2003

Information on PDD development organization:

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URL:	-
Represented by:	-
Title:	General Director
Salutation:	Mr.
Last name:	Bellomo
Middle name:	-
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