INITIAL AND FIRST JI MONITORING REPORT

VERSION 4.0 DATED 20 SEPTEMBER 2011

CONTENTS

Annexes

SECTION A. General project activity and monitoring information

A.1 Title of the project activity:

Slag usage and switch from wet to dry process at Yugcement, Ukraine.
Sectoral scope 4: Manufacturing industries

A.2. JI registration number:

The project is registered with the number of JI0188.
ITL ID of the Project is UA2000027

A.3. Short description of the project activity:

Cement production is an energy intensive process that generates significant volume of greenhouse gas emissions, in particular, CO_2. There are three main sources of CO_2 emissions in the cement production process: the first source is fossil fuel combustion; the second source is chemical decomposition of limestone into calcium oxide and carbon dioxide; the third source, being smaller as to compare with the first two, is the grid emissions due to electricity consumption of plant motor drives (e.g. kiln rotation, pumping, fans) and other power consumers.
Before the project start, slag has not been added into the raw meal for the kilns.

The project aims to significantly decrease emissions from the first two sources (from fossil fuel combustion and calcination) at Yugcement factory. The project foresees introduction of alternative raw materials, namely blast furnace slag (BFS), as a decarbonized raw material in the raw meal supplied to the kilns. Addition of slag reduces emissions due to calcination and emissions due to fuel consumption. According to the plan, BFS will be added from 1 January 2009.

It is foreseen that slag addition process will be implemented in two steps. Under the first step about 4% of unground BFS will be added. The second step will follow when all technical issues related to slag adoption are solved. It provides for introduction of slag milling facility and gradual increase of slag proportion to about 15%.

A.4. Monitoring period:

- Monitoring period starting date: 01.01.2009 at 00:00;
- Monitoring period closing date: 31.03.2011 at 24:00[1]

A.5. Methodology applied to the project activity (incl. version number):

JI specific approach regarding baseline setting and monitoring has been developed in accordance with Appendix B of the JI Guidelines and with the JISC Guidance. This specific approach is based on selected elements of the ACM0015[2] and JI Guidance on Criteria for Baseline Setting and Monitoring, Version 02[3].

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[1] Both days included

[2] http://cdm.unfccc.int/EB/036/eb36_repan15.pdf

[3] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

A.5.1. Baseline methodology:

The “Guidance on criteria for baseline setting and monitoring, Version 02”, issued by the Joint Implementation Supervisory Committee (JISC) allows using approved methodologies of the Clear Development Mechanism (CDM)[4]. The project design document (PDD), determined by an accredited independent entity (AIE), uses a JI project specific approach to establish the baseline scenario.

Baseline scenario provides for producing of clinker without addition alternative raw material. Baseline emission sources are:

- GHG emissions from fuel combustion – emissions from combustion of fuel in the kiln, combustion of fuel for coal drying;
- GHG emissions from calcination process – limestone $CaCO_3$ at high temperature decomposes into calcium oxide CaO used for clinker and carbon dioxide CO_2 which emits into the atmosphere;
- Power is used for operation of kilns and devices maintaining clinker production process thus causing indirect GHG emissions from grid electricity consumption.

A.5.2. Monitoring methodology:

A JI specific monitoring approach was developed for this project in line with the JI Guidance on Criteria for Baseline Setting and Monitoring, Version 02. The resulting Monitoring Plan was determined as part of the determination process.

Monitoring activities include personnel training, measurement activities, checking of all meters used within project frames, monitoring of environmental impact and calculation of GHG emission reduction.

The parameters involved in the Project frames are monitored in a following manner:

- The amount of clinker produced is determined taking into account load of kilns and properties of raw meal supplied into them;
- Fuel consumption for clinker production (kiln reheating, slag and coal drying) is being metered by gas flow meters and coal weight feeders;
- Electricity consumption is monitored by a group of power meters located in the central distributing substation of the plant and transforming substation #11;
- Weight feeder of slag and flow meters of slurry carry out measurement of raw material consumption for raw meal;
- The plant laboratory is responsible for issuing reports on content of CaO and MgO in clinker, raw materials and slag.

A.6. Status of implementation including time table for major project parts:

The Letters of Approval for the Project were obtained from parties involved:
The LoA from National Environmental Investment Agency of Ukraine #1399/23/7 from 16 September 2010.
The LoA from Federal Environment Agency; German Emission Trading Authority from 22 July 2010.
The LoA from Ministry of Economic Affairs, Netherlands #2009JI14 from 7 January 2010.
The mentioned documents can be found at:

[4] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

http://ji.unfccc.int/JI_Projects/DB/PZ7FNGT0G2M88MMXVUCPU4B5J1NUBA/Determination/Bureau%20Veritas%20Certification1285667148.21/viewDeterminationReport.html

The project implementation started on the 1st of January 2009. The actual achieved share of slag addition in the raw meal is presented in a table below:

Table 1: Status of project implementation during 2009-2011

Year	Slag addition percentage achieved, %
2009	0.74
2010	0.1
2011	0.52

Please refer to the explanations on the actual percentage of slag addition achieved provided in the Section A.7. of this report.

A.7. Intended deviations or revisions to the registered PDD:

The JI project was made publicly available on the UNFCCC website. The full text of PDD could be found at
http://ji.unfccc.int/JI_Projects/DB/PZ7FNGT0G2M88MMXVUCPU4B5J1NUBA/Determination/Bureau%20Veritas%20Certification1285667148.21/viewDeterminationReport.html

Monitored amount of emission reduction differs from the one expected in PDD for the respective period stated in A.4. as shown in a table 2 below:

Table 2: Monitored and estimated amounts of ERU for 2009-2011

Year	2009	2010	2011[5]
ERs in MR001 (tons of CO_2 equiv.)	15316	786	2020
ERs in the determined PDD (tons of CO_2 equiv.)	12778	17953	16831[6]

In order to master slag addition technology special slag feeding facility has been installed and commissioned. As one may know, slag addition causes increase of saturation coefficient in the kiln making clinker production more complicated. Thus after project start in 2009 the facility has been working in a test mode varying volume of slag addition for adjusting the technology of clinker production. In 2010 there were difficulties with equipment and slag procurement therefore share of slag addition was 0.1%.

For 2011, owner of the plant, Dyckerhoff AG has planned that Yugcement plant must achieve 2% slag addition level by the end of the year. In future it is foreseen to install slag grinding facility that will allow increasing of slag addition up to 15%, but this activity is postponed due to the lack of financing caused by financial crisis in Ukraine.

Thereby during the Project implementation the slag has been added in lesser volume than that of foreseen in PDD, which, in its turn, caused lesser amount of emission reductions achieved in the monitoring period.

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[5] From 01.01.2011 to 31.03.2011

[6] Representing value of estimated ER for 2011 year, for 3 months out of 12. Obtained by dividing PDD estimated value of emission reductions 67324 tCO_2e by 12 and multiplying by 3.

There are no other deviations to the determined PDD.

A.8. Intended deviations or revisions to the registered monitoring plan

1) Slag addition has very minor effect on electricity consumption for kiln operation and raw material preparation and handling. According to the selected approach, it is assumed that substituting some raw materials with slag will result in emission reductions due to lesser amount of required raw materials and, consequently, lower electricity consumption. Baseline electricity consumption for kiln operation and raw material preparation has been fixed ex-ante in the monitoring plan contained in the registered PDD. However, in practice this parameter is influenced not only by the project activity but also by a number of different factors: conditions at the raw materials excavation site, production level etc. Therefore, it can be hard to isolate project activity impact on this parameter from other influences. In order to provide clear calculation of greenhouse gas emissions and decrease uncertainty level it was decided to use actual monitoring data for baseline electricity consumption for kiln operation and raw material preparation. Thus $BE_{EL} = PE_{EL}$ making emission reduction due to electricity consumption for kiln operation and raw material preparation equal to 0. Proposed approach is, therefore, conservative;

Table 3: Deviations to the previous monitoring plan

Revised monitoring plan			Approved monitoring plan		
Variable	**Unit**	**Method of monitoring**	**Variable**	**Unit**	**Method of monitoring**
$BE_{EL,y}$	tCO_2	To be calculated by formula: $BE_{El,y} = EF_{el,y} \times EL_y \times CLNK_y$ Where: $BE_{EL,y}$ - Baseline emission due to electricity consumption for preparation of raw meal and kilns electricity consumption in the year y (tCO_2); $EF_{el,y}$ - CO_2 emission factor for electricity consumed from the grid by the project activity; EL_y - Specific electricity consumption of equipment for raw meal preparation and wet kilns operation in the year y; $CLNK_y$ - Volume of annual clinker production in the year y	$BE_{EL,y}$	tCO_2	Calculated by formula: $BE_{EL,y} = EF_{el,y} \times EL_{BSl} \times CLNK_y$ Where: $BE_{EL,y}$ - Baseline emission due to electricity consumption for preparation of raw meal and kilns electricity consumption in the year y; $EF_{el,y}$ - CO_2 emission factor for electricity consumed from the grid by the project activity; EL_{BSL} - Specific electricity consumption of equipment for raw meal preparation and wet kilns operation in the Baseline scenario (fixed ex-ante); $CLNK_y$ - Volume of annual clinker production in the year y

2) In the accepted Monitoring Plan, it is stated that the source of data for $EF_{el,y}$ are plant records. Actually, the source of data is the study "Standardized emission factors for the Ukrainian electricity grid" performed by Global-Carbon and verified by TUV SUD on 17/08/2007;
3) In the accepted Monitoring Plan, it is stated that the source of data for $EF_{fuel\_i,y}$ are plant records. Actually, the source of data for emissions factors of fuel (coal and natural gas) used during the project activity is the IPCC study "Guidelines for National Greenhouse Gas Inventories" issued in 2006;
4) The fuels used during the monitoring period were natural gas and coal. For the proper identification of monitoring parameters, units $EF_{fuel\_i,y}$ [tCO_2/GJ], $FF_{fuel\_i,y}$ [t] and $NCV_{fuel\_i,y}$ [GJ/t]

indicated in the PDD have been replaced by the units $EF_{fuel\_NG,y}$ [tCO_2/GJ], $FF_{fuel\_NG,y}$ [1000m^3]and $NCV_{fuel\_NG,y}$ [GJ/1000m^3] when natural gas was used as a fuel, and $EF_{fuel\_Coal,y}$ [tCO_2/GJ], $FF_{fuel\_Coal,y}$ [t] and $NCV_{fuel\_Coal,y}$ [GJ/t] when coal was used as a fuel correspondingly.

There are no other deviations to the determined monitoring plan (MP).

A.9. Deviations since last verification

Not applied.

A.10. Person(s) responsible for the preparation and submission of the monitoring report:

Public Joint Stock Company "Yugcement":

- Julia Golovchuk, Chief ecologist.

Global Carbon Ukraine:

- Denis Prusakov, Senior JI consultant;
- Iurii Petruk, Junior JI consultant.

SECTION B. Key monitoring activities

The emission sources of greenhouse gases in the baseline and in the project are:

- Emissions due to fuel combustion (combustion for kiln heating and combustion for slag and coal drying);
- Emissions from calcination of raw materials at high temperatures in the kilns;
- Indirect emissions due to consumption of electricity from the grid.

The following parameters are monitored in order to calculate greenhouse gas emission reductions:

Table 4: General information on data monitoring

1. Kiln fuel consumption
Cement plant has 2 rotary kilns. Each kiln has capacity of 72 t clinker/hour and can operate up to 320 days per year. Originally only natural gas (NG) was used as a fuel for rotary kilns but due to tendency of constant price increase, rotary kilns have been switched to coal as main fuel. Since then natural gas has been used for initial reheating and ignition of coal in the furnaces and as backup fuel for kilns. Consumption of natural gas of both kilns is constantly monitored by a gas metering facility "Siemens PLC s7-416" which obtains and analyzes data from pressure, flow and temperature sensors located within gas supply system of the kilns. Coal consumption for kiln heating is constantly measured by 2 weight feeders Schenck MULTICOR K50 located between coal dust silo and each kiln.
2. Fuel consumption for pre-drying of coal and alternative raw materials
Alternative raw materials (ARM) are added into the kiln in dry state separately from the slurry. Their drying is being conducted in a drying drum which is reheated by NG. Electronic device OE-DM IZ meters natural gas consumption of the drum in normalized m^3 by use of processing values that are being obtained from pressure diaphragm, temperature converter and pressure converter installed on the gas supply pipe. Coal supplied to the plant has high content of moisture; prior to be used it has to be dried and milled to dust. Coal drying is being carried out in a heat generator using NG as a fuel. Turbine type meter Actaris D-76161 is applied for metering and recording the amount of natural gas consumed by the heat generator.
3. Net calorific values of fuels used
The fuels used for clinker production are natural gas and coal. The net calorific value (NCV) of natural gas is monitored using fuel certificates issued by Kharkivtransgas monthly. The NCV of coal is monitored by use of reports of special accredited SGS laboratory that performs chemical analysis of coal per each shipment.
4. Electricity consumption
Electricity consumption for kiln operation and raw material preparation and handling is measured by the group of electrical meters. Meters of electricity consumed for kiln operation and coal drying are located in the central distributing substation (CDS) of the plant. Meters involved in monitoring of electricity consumed for raw meal preparation and handling are located in Transforming substation #11 (TS#11).

5. CaO and MgO content in the clinker produced
Plant laboratory is responsible for constant monitoring of CaO and MgO content in clinker produced and materials used for clinker manufacturing. The chemical analysis of clinker on MgO and CaO content is conducted once per twenty four hours.
6. Non-carbonated CaO and MgO content in raw meal
Monitoring of non-carbonated content of CaO and MgO in the raw meal is calculated by use of next data: • Quantity of slurry supplied to the kilns. CaO and MgO content in the slurry, quantity of dry material in the slurry. • Quantity of dry ARM supplied to the kilns. CaO and MgO content in the slag. The chemical analysis on MgO and CaO content in the slurry is conducted once per twelve hours. The chemical analysis on MgO and CaO content in slag is conducted for each shipment.
7. Quantity of raw meal (RM) consumed by the kilns
The monitoring is based on constant measurement of amount of slurry and BFS consumed by each rotary kiln. It takes into account composition, moisture content of slurry in order to define amount of dry material in the raw meal. These properties of slurry are tested every 12 hours by the laboratory of Yugcement. Amount of slurry supplied to the kilns is metered by flow meters Yokogawa AXF150 installed before each kiln. Quantity of slag added to the slurry is measured by one weight feeder Schenck MTD1020 supplying slag to both kilns.
8. Quantity of clinker produced by the kilns
Clinker production is calculated based on constant metering of raw meal volume, chemical composition of RM (moisture and chemical composition monitored by plant laboratory) and operational time of the kilns.

B.1. Monitoring equipment:

The monitoring equipment can be divided into four groups: gas flow meters, power meters, weight meters and slurry flow meters.

Gas flow meters

Four gas flow meters are installed at NG pipelines for measurement of amount of natural gas consumed for clinker production as shown in Figure 1 below. Two of them monitor natural gas consumption of the kilns, the others – NG consumption for coal drying and for slag drying.

<u>Natural gas consumption of the kilns:</u>
Natural gas consumption of each kiln is constantly monitored by microprocessor device “Siemens PLC s7-416” that receives and analyzes data from pressure, flow and temperature sensors installed within gas supply system of the kilns. Natural gas consumption of each kiln

The orifice pressure drop method is used for measuring kiln fuel consumption (natural gas): orifice is installed together with the pressure sensor; it causes increase of the gas flow rate in the narrow area and decrease of absolute pressure there; thus gas flow is metered by measuring the difference of pressure in the device and in a pipe area after it. Pressure and temperature sensors measure corresponding parameters of the gas. In order to obtain normalized values of natural gas consumption, flow, temperature and pressure are used for calculations.

<u>Natural gas consumption of the heat generator for coal drying:</u>

The meter Actaris D-76161 with a turbine mechanism measures and records consumption of natural gas for coal drying. Its principle of operation is: turbine wheel that is located in the gas channel propels under gas flow; by use of reducer and a magnetic clutch the rotating motion is being transferred to the counting mechanism.

<u>Natural gas consumption of the slag drying drum:</u>

Natural gas consumption for slag drying is monitored by electronic calculating-recording device OE-DM IZ, which obtains values from flow meter, pressure meter and temperature sensor and displays normalized m^3 consumption. It this case gas flow is calculated by use of monitoring and processing of differential pressure in the pipeline.

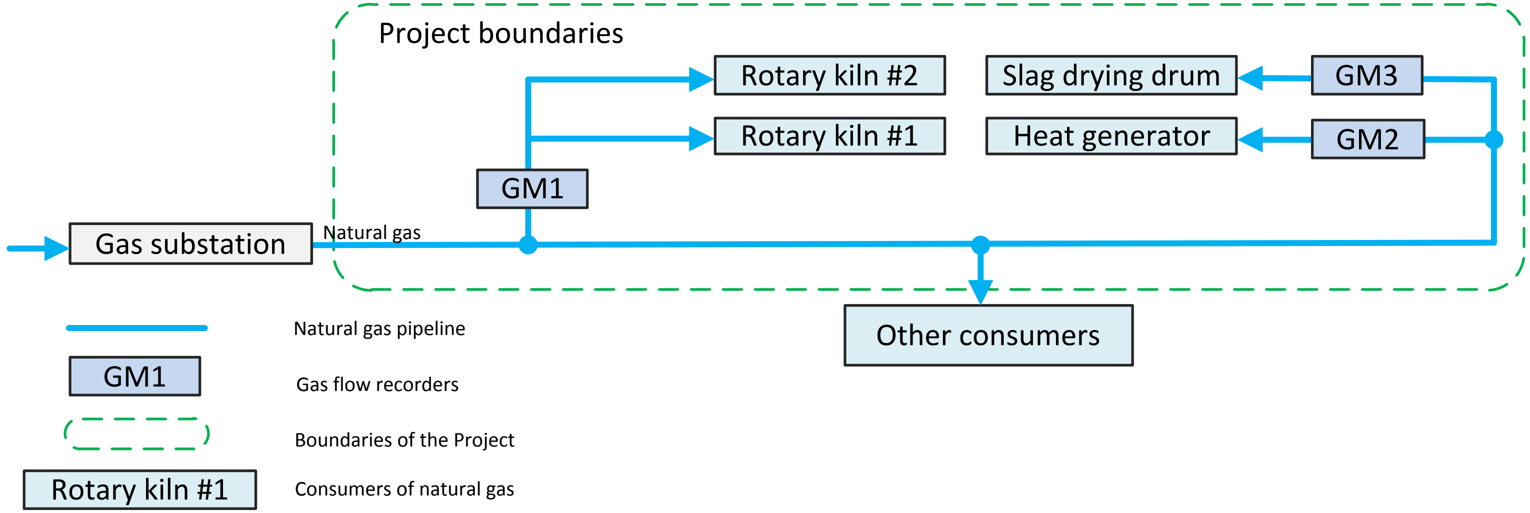

Figure 1: Gas supply and metering diagram

Data on natural gas consumption are collected daily and transferred to automatic control system (ACS) where processed and transferred to financial department of the plant.

Coal weight meters

The weight of coal combusted in the kilns is measured by 2 weight feeders Schenck MTD 1860 that are installed at the line of coal dosing and supply of each kiln.

Power meters

Power meters measure electricity consumed for the following activities:

- Rotary kiln operation;
- Preparation and transfer of slurry;
- Preparation and transfer of slag;
- Preparation and conveying of coal;
- Operations of compressors and pumps involved in clinker production.

Measurement of electricity within project boundaries is carried out by 27 power meters. 18 of them are located in the central distributing substation of the plant and 9 are situated in transforming substation #11.

Daily report is issued based on data collected from the power meters. The data are transferred to financial department where processed using software “1C-Electricity” and stored.

Slurry flow meters

Two flow meters “Yokogawa” measure amount of slurry fed into the kilns. The devices are located at the supply line of the kilns.

Slag weight meters

The weight of slag supplied into the kilns is measured by weight feeder Schenck Multidos MTD1020 that is installed before the supply line of kilns.

B.1.2. Table providing information on the equipment used (incl. manufacturer, type, serial number, date of last calibration, date of next calibration, accuracy)

Gas flow sensors and recorders

Table 4: Gas flow sensors and recorders

Equipment	Variable	Unit	Producer/type	Serial number	Last calibrations	Next calibration	Accuracy	Comments
Natural gas consumption of the rotary kilns								
Gas flow recorder #1 (GM1)	$FF_{fuel\_NG,y}$	normalized m^3	Siemens PLC s7-416	6ES7416-3ER05-0AB0	01/07/2010	01/07/2012	0.91 %	NG consumption recorder of two rotary kilns
Differential pressure sensor		mbar	Sitrans 7MF4433-1DA02-2AB7-Z	N1-T711-9519102	14/10/2008 14/10/2009 14/10/2010	14/10/2011	1 %	Rotary kiln #1
Absolute pressure sensor		bar	Sitrans 7MF4233-1GA00-2AB7-Z	N1-T711-9519094	14/10/2008 14/10/2009 14/10/2010	14/10/2011	1 %	Rotary kiln #1
Absolute pressure sensor		bar	Sitrans 7MF4233-1GA00- 2AB7-Z	N1-T711-9519096	14/10/2008 14/10/2009 14/10/2010	14/10/2011	1 %	Rotary kiln #1
Differential pressure sensor		bar	DMP 331i	52010433	14/10/2008 14/10/2009 14/10/2010	14/10/2011	0.2 %	Rotary kiln #1
Temperature sensor		^oC	TSP 1187-100P	206	14/10/2008 14/10/2009 14/10/2010	14/10/2011	0.35 %	Rotary kiln #1
Differential pressure sensor		kPa	Honeywell STD 110- 0- A1A-00000-LP MB	405842	07/10/2008 07/10/2009 07/10/2010	07/10/2011	0.1 %	Rotary kiln #2
Differential pressure sensor		kPa	Honeywell STD 924- E1A-00000-LP MB	475827	07/10/2008 07/10/2009 07/10/2010	07/10/2011	0.1 %	Rotary kiln #2
Absolute pressure sensor		MPa	MIDA-DA-13P-01	02409084	07/10/2008 07/10/2009 07/10/2010	07/10/2011	0.2 %	Rotary kiln #2

Temperature sensor		^oC	TSP 1187	706	07/10/2008 07/10/2009 07/10/2010	07/10/2011	0.35 %	Rotary kiln #2
Natural gas consumption for coal drying in the heat generator								
Gas flow meter and recorder #2 (GM2)		normalized m^3	Actaris D-76161	3138611001/c	01/05/2010	01/05/2012	1 %	NG consumption of the heat generator
Natural gas consumption for slag drying								
Gas flow recorder #3 (GM3)	$FC_{slag, y}$	normalized m^3	OE-22DM IZ	0550	10/12/2008 16/03/2010	16/03/2012	3 %	NG consumption of the slag drying drum
Differential pressure sensor		kPa	Rosemount 3095FB	0221316	20/10/2008 19/10/2009 18/10/2010	18/10/2011	0.075 %	Slag drying drum
Temperature sensor		^oC	TSP 1187-100P	590	20/10/2008 19/10/2009 18/10/2010	18/10/2011	0.35 %	Slag drying drum
Absolute pressure sensor		MPa	DKS 0,6-100-1A/B-3	4052	20/10/2008 19/10/2009 18/10/2010	18/10/2011	1 %	Slag drying drum

Coal weight feeders

Table 5: Coal weight feeders

Equipment	**Variable**	**Unit**	**Producer/type**	**Serial number**	**Last calibration**	**Next calibration**	**Accuracy**	**Comments**
Coal weight feeder #1 (WF1)	$FF_{fuel\_coal,y}$	t	Schenck MTD 1860	08012	05/07/2010 05/07/2011	05/07/2012	0.5 %	Coal supply of the kiln #1
Coal weight feeder #2 (WF2)			Schenck MTD 1860	08011	05/07/2010 05/07/2011	05/07/2012	0.5 %	Coal supply of the kiln #2

Power meters

Table 6: Power meters

Equipment	Location/ meter abbreviation	Manufacturer/ type	Serial number	Unit	Accuracy	Last calibration	Next calibration	Comments
Power consumption for coal drying								
Power meter #1	**CDS, EM1**	CE6805B	0851490802797405	kWh	0.5 %	03/03/2008	03/03/2016	
Power meter #2	**CDS, EM2**	CE6805B	9561821	kWh	0.5 %	03/03/2008	03/03/2016	
Power meter #3	**CDS, EM3**	CE6805B	0851490802797195	kWh	0.5 %	03/03/2008	03/03/2016	
Power meter #4	**CDS, EM4**	CE6805B	95261813	kWh	0.5 %	03/03/2008	03/03/2016	
Power consumption for raw meal preparation								
Power meter #5	**TS #11, EM5**	CE6811	1101815	kWh	1 %	10/03/2008	10/03/2014	
Power meter #6	**TS #11, EM6**	CE6805	42063759	kWh	0.5 %	10/03/2008	10/03/2014	
Power meter #7	**TS #11, EM7**	CE6811	1101835	kWh	1 %	10/03/2008	10/03/2014	

Power meter #8	**TS #11, EM8**	SA3U-I670M	036179	kWh	2 %	10/03/2008	10/03/2018	
Power meter #9	**TS #11, EM9**	SA3U-I670M	036398	kWh	2 %	10/03/2008	10/03/2018	
Power meter #10	**TS #11, EM10**	CE6811	1100997	kWh	1 %	11/03/2008	11/03/2014	
Power meter #11	**TS #11, EM11**	CE6805B	139101	kWh	0.5 %	11/03/2008	11/03/2014	
Power meter #12	**TS #11, EM12**	CE6805	42063935	kWh	0.5 %	11/03/2008	11/03/2014	
Power meter #13	**TS #11, EM13**	CE6811	1101889	kWh	1 %	11/03/2008	11/03/2014	
Kiln power consumption								
Power meter #14	**CDS, EM14**	SA3U-I670M	067590	kWh	2 %	20/03/2008	20/03/2018	
Power meter #15	**CDS, EM15**	SA3U-I670M	985999	kWh	2 %	20/03/2008	20/03/2018	
Power meter #16	**CDS, EM16**	SA3U-I670M	653903	kWh	2 %	20/03/2008	20/03/2018	
Power meter #17	**CDS, EM17**	SA3U-I670M	887602	kWh	2 %	20/03/2008	20/03/2018	

Power meter #18	**CDS, EM18**	SA3U-I670M	946051	kWh	2 %	21/03/2008	21/03/2018	
Power meter #19	**CDS, EM19**	SA3U-I670M	881423	kWh	2 %	21/03/2008	21/03/2018	
Power meter #20	**CDS, EM20**	SA3U-I670M	890941	kWh	2 %	21/03/2008	21/03/2018	
Power meter #21	**CDS, EM21**	SA3U-I670M	891248	kWh	2 %	27/03/2008	27/03/2018	
Power meter #22	**CDS, EM22**	SA3U-I670M	176118	kWh	2 %	27/03/2008	27/03/2018	
Power meter #23	**CDS, EM23**	SA3U-I670M	259271	kWh	2 %	27/03/2008	27/03/2018	
Power meter #24	**CDS, EM24**	SA3U-I670M	322890	kWh	2 %	28/03/2008	28/03/2018	
Power meter #25	**CDS, EM25**	SA3U-I670M	618297	kWh	2 %	28/03/2008	28/03/2018	
Power meter #26	**CDS, EM26**	SA3U-I670M	132743	kWh	2 %	28/03/2008	28/03/2018	
Power meter #27	**CDS, EM27**	SA3U-I670M	074823	kWh	2 %	28/03/2008	28/03/2018	

Slag weight feeder

Table 7: Slag weight feeder

Equipment	Unit	Producer/type	Serial number	Last calibration	Next calibration	Accuracy	Comments
Slag weigh feeder #1	t	Schenck MTD 1020	V038534.B01	08/02/2008 09/02/2009 08/02/2010 08/02/2011	08/02/2012	0.5 %	Slag supply of kiln #1 and kiln #2

Flow meters of slurry

Table 8: Flow meters of slurry supplied to the kilns

Equipment	Unit	Producer/type	Serial number	Last calibration	Next calibration	Accuracy	Comments
Flow meter #1	m^3/h	Yokogawa, AXF150	S5E607296526	07/11/2008 08/11/2010	08/11/2012	0.35 %	Rotary kiln #1
Flow meter #2		Yokogawa, AXF150	S5GB01610743	07/11/2008 08/11/2010	08/11/2012	0.35 %	Rotary kiln #2

B.1.3. Calibration procedures:

For natural gas flow recorders and sensors:

QA/QC procedures	Body responsible for calibration and certification
Calibration of equipment for natural gas flow recorders is performed once per two years Calibration of sensors used for monitoring of natural gas flow is performed on annual basis	Metrological department of the plant

For power meters:

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of CE6811 is 6 years Calibration interval of CE6805 is 6 years Calibration interval of CE6805B is 8 years Calibration interval of SA3U-I670M is 10 years	Metrological department of the plant

For coal and slag weigh feeders:

QA/QC procedures	Body responsible for calibration and certification
Calibration of such equipment is performed once per year	Metrological department of the plant

For slurry flow meters:

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of such meters is 2 years	Metrological department of the plant

B.1.4. Involvement of Third Parties:

Ukrainian Centre for Standardization and Metrology
Gas distribution company “Gaspromzbut Ukraine”;
Coal distribution company “Kremenchukpropangaz”;
Coal distribution company “Ukrenergy Coal ltd”

B.2. Data collection (accumulated data for the whole monitoring period):

B.2.1. List of fixed default values:

Table 9: Baseline and Project fixed default values

Parameter number from PDD	Data variable	Source of data	Data unit	Value	Comment
P13	$EF_{el,y}$ CO_2 emission factor for electricity consumed from the grid during the project activity	Standardized emission factors for the Ukrainian electricity grid	tCO_2/MWh	0.896	See Annex 2 to PDD ver. 5.0 from 20 September 2010
P14	$EF_{fuel\_NG,y}$ CO_2 emission factor of the NG combustion process	IPCC 2006	tCO_2/GJ	0.0561	IPCC 2006 default value for natural gas combustion Volume 2 “Energy” Chapter 2 “Stationery combustion” Table 2.3
P14	$EF_{fuel\_Coal,y}$ CO_2 emission factor of the coal combustion process	IPCC 2006	tCO_2/GJ	0.0983	IPCC 2006 default value for anthracite combustion Volume 2 “Energy” Chapter 2 “Stationery combustion” Table 2.3

Table 10: Baseline ex-ante factors

Parameter number from PDD	Data variable	Source of data	Data unit	Value	Comment
	CaO_{RM_Bsl} Content of non-carbonated CaO in the raw mill in the baseline	Baseline information	%	0	See PDD ver.5.0 Section B.1.
	MgO_{RM_Bsl} Content of non-carbonated MgO in the raw mill in the baseline	Baseline information	%	0	See PDD ver.5.0 Section B.1.
	CaO_{CLNK_Bsl} Content of CaO in the clinker in the	Baseline information	%	65.24	See PDD ver.5.0 Annex 2

	baseline				
	MgO_{CLNK_Bsl} Content of MgO in the clinker in the baseline	Baseline information	%	1.81	See PDD ver.5.0 Annex 2.
B11	*BKE_{BSL}* Baseline kiln efficiency	Baseline information	GJ/ton of clinker	6.08	See PDD ver.5.0 Annex 2
B14	*$ELSP_{coalmill,y}$* Specific electricity consumption for coal milling and coal conveying in the year y	Baseline information	MWh/ton of coal	0.017	See PDD ver.5.0 Annex 2

B.2.2. List of variables:

Table 11: Project monitored variables

Parameter number from PDD	Data variable	Data unit	Method of monitoring	Meters used for calculation
P16	*$CLNK_y$* Volume of annual clinker production in the year y	Tons	Sum of daily kiln production reports	Slag weight feeders, slurry flow meters
P19	*RM_y* Annual RM consumption in the year y	Tons	Calculated by use of data from the slurry flow meters and the slag weigh feeder	Slag weight feeders, slurry flow meters
P17	$CaO_{CLNK,y}$ Average annual contents of CaO in the clinker in the year y	%	Average of CaO content in clinker based on daily and monthly laboratory reports	Chemical analysis made at plant chemical lab according to DSTU B V.2.7-202:2009
P18	*$MgO_{CLNK, y}$* Annual average contents of MgO in the clinker in the year y	%	Average of MgO content in clinker based on daily and monthly laboratory reports	Chemical analysis made at plant chemical lab according to DSTU B V.2.7-202:2009
P20	*$CaO_{RM, y}$* Annual average contents of CaO in the raw meal in the year y	%	Calculated using annual average of CaO content in slurry and slag based on daily and monthly laboratory reports	Chemical analysis made at plant chemical lab according to DSTU B V.2.7-202:2009
P21	*$MgO_{RM, y}$* Annual average contents of MgO in the raw meal in the year y	%	Calculated using annual average of MgO content in slurry and slag based on daily and monthly laboratory reports	Chemical analysis made at plant chemical lab according to DSTU B V.2.7-202:2009

P22	$FF_{fuel\_coal,y}$ Kiln coal consumption in the year y	Tons	Measured by coal weigh feeders	$FF_{fuel\_coal,y}$ = WF1+WF2 (see Table 5)
P22	$FF_{Fuel\_NG, y}$ Kiln NG consumption in the year y	1000 normalized m^3	Measured by the gas flow recorder	$FF_{Fuel\_NG, y}$ = GM1 (see Table 4)
P25	$FC_{heat\_gen,y}$ Heat consumption for drying of coal in the year y	GJ	Calculated by use of data from GM2 and NCV of natural gas used for drying of coal	$FC_{heat\_gen,y}$ =GM2*$NCV_{fuel\_NG,y}$ (see Table 4)
P15	$NCV_{fuel\_coal,y}$ Net calorific values of coal used in the year y (annual average)	GJ/ton	Coal laboratory certificates	SGS laboratory provides NCV certificate on each shipment of coal
P15	$NCV_{fuel\_NG,y}$ Net calorific values of natural gas used in the year y (annual average)	GJ/1000 normalized m^3	Gas laboratory certificates	Gas laboratory provides NCV certificate on monthly basis
P26	$EL_{slag, y}$ Grid electricity consumption for slag drying and conveying in the year y	MWh	Calculated based on specific power consumption for slag drying and conveying and amount of slag used for clinker production	Slag weight feeder
P23	EL_y Specific electricity consumption of equipment for raw meal preparation and wet kilns operation in the year y	MWh/ton of clinker	Calculated using amount of electricity consumed for clinker production and volume of annual clinker production	Data provided by the plant. Based on values from power meters EM1-EM27 and $CLNK_y$ (see Table 6)
P27	$FC_{slag, y}$ Fuel consumption of slag dryer in the year y	GJ	Calculated using amount of natural gas combusted for slag drying and its NCV	$FC_{slag, y}$ =GM3* $NCV_{fuel\_NG,y}$ (see Table 4)
P24	$EL_{Coalmill,y}$ electricity consumption for coal milling and conveying in the year y	MWh	Calculated using technical characteristics of the milling equipment and amount of coal milled in the year y	The specific consumption of power for milling of 1 ton of coal is 0.017 MWh/t according to the project data See PDD ver.5.0 Annex 2

B.2.3. Data concerning GHG emissions by sources of the project activity:

Table 12: Project monitored variables

Parameter number from PDD	Variable	Description	Unit	2009	2010	2011[7]
P16	$CLNK_y$	Clinker production in the year y	Ton	471025	491720	108830
P19	RM_y	Consumption of raw meal in y	Ton	769183.56	798415.59	174036.84
P17	$CaO_{CLNK,y}$	Average annual contents of CaO in the clinker in the year y	%	65.51	65.16	64.92
P18	$MgO_{CLNK,y}$	Average annual contents of MgO in the clinker in the year y	%	1.53	1.76	1.85
P20	$CaO_{RM,y}$	Annual average contents of non-carbonated CaO in the raw meal in the year y	%	0.342	0.045	0.244
P21	$MgO_{RM,y}$	Annual average contents of non-carbonated MgO in the raw meal in the year y	%	0.0366	0.0054	0.0266
P22	$FF_{fuel\_coal, y}$	Kiln coal consumption in the year y	Ton	-	65524.63	23184.56
P22	$FF_{fuel\_NG, y}$	Kiln NG consumption in the year y	1000 normalized m^3	77238.36	35822.54	252.31
P25	$FC_{heat\_gen,y}$	Heat consumption for drying of coal in the year y	GJ	-	29326.67	11583.79
P15	$NCV_{fuel\_coal,y}$	Average net calorific value of coal in the year y	GCal/t	-	6.508	6.576
P15	$NCV_{fuel\_NG,y}$	Average net calorific value of natural gas in the year y	GCal/1000 normalized m^3	8.154	8.127	8.108
P26	$EL_{slag, y}$	Grid electricity consumption for slag drying in the year y	MWh	53.1	7.3	8.4

[7] From 01.01.2011 to 31.03.2011

P23	EL_y	Power consumption for clinker production including raw meal preparation and fuel preparation in the year y	MWh/t	0.082	0.086	0.104
P27	$FC_{slag,y}$	Heat consumption for slag drying in the year y	GJ	3023.32	417.38	553.68
P24	$EL_{coalmill,\ y}$	Grid electricity consumption for coal milling in the year y	MWh	N/A[8]	1114	394

B.2.4. Data concerning GHG emissions by sources of the baseline:

Table 13: Data used in the baseline scenario

Parameter number from PDD	Variable	Description	Unit	Value	Comment
	$CaO_{\mathrm{CLNK,Bsl}}$	Average annual contents of CaO in the clinker	%	65.24	Source of data is Annex 2 to PDD ver. 5.0
	$MgO_{\mathrm{CLNK,Bsl}}$	Average annual contents of MgO in the clinker	%	1.81	Source of data is Annex 2 to PDD ver. 5.0
B11	BKE_{BSL}	Baseline kiln efficiency	GJ/ton of clinker	6.08	Source of data is Annex 2 to PDD ver. 5.0
B14	$ELSP_{coalmill,\ y}$	Specific electricity consumption for coal milling and coal conveying in the year y	MWh/ton of coal	0.017	Source of data is Annex 2 to PDD ver. 5.0
B16	$FSP_{heat\_gen,\ i,\ 2010}$	Specific fuel consumption of the heat generator for coal drying in 2010	GJ/ton of coal	0.447	Calculated by formula: $FSP_{heat\_gen,i,y} = FC_{heat\_gen,y}/FF_{fuel\_coal,y}$
B16	$FSP_{heat\_gen,\ i,\ 2011}$	Specific fuel consumption of the heat generator for coal drying in 2011[9]	GJ/ton of coal	0.499	

B.2.5. Data concerning leakage:

No leakage has been identified in the PDD, therefore this section is not applicable.

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[8] During 2009 only natural gas was used as a fuel

[9] From 01.01.2011 to 31.03.2011

B.2.6. Data concerning environmental impacts:

Cement production has certain impact on the local environment. In Ukraine emission levels in industry are regulated by operating licenses issued by regional offices of the Ministry for Environmental Protection on the individual basis for every enterprise that has significant impact on the environment. The current levels of the emissions of the main pollutants (dust, sulphur oxides and nitrogen oxides), are in compliance with the requirements of the plant's operational license. The environmental impacts of the project are positive as the project expects to reduce the impact of the existing facility.

The allowance #15.10/11 from 06 April 2011 limiting the volume of wastes to be produced by PJSC Yugcement was issued by the State Administration of Environmental Protection of Mykolayiv oblast. The wastes resulted from plant activities should be temporary displaced within the plant’s area with further utilization or storage at landfills. Only entities that are licensed for operations with wastes should perform waste utilization.

The allowance #01-04/3372-06 from 11.06.2011 limiting the emissions into the atmosphere was issued by the State Administration of Environmental Protection of Mykolayiv oblast. This document requires that:

- The amount of emissions into the atmosphere must not exceed the designated level;
- The report on the monitoring of emissions should be issued on the quarter basis;
- The manufacturing works should be carried out according to the ecological requirements and restrictions;
- Maintenance, monitoring and troubleshooting of equipment used in manufacturing should be carried out on the constant basis;
- Gas-dust flow should be filtered;
- Analysis of emissions should be carried out according to the designated schedule;
- Exploitation of the plant should be carried out according to all safety requirements.

The plant has obtained allowance #UKR 2820 A/NIK from 24 December 2008 issued by the State Administration of Environmental Protection of Mykolayiv oblast for special water utilization valid until 22 December 2011. It is stated that the plant is authorized for surface water intake from Yuzhniy Bug river and for water intake from one subsurface well. Resulting waste water is to be passed to municipal entity “Olshansky vodokanal” where the water is to be refined.

B.3. Data processing and archiving (incl. software used):

<u>Fuel consumption</u>

Natural gas consumption is measured by gas meters and as shown in Table 4 and then is displayed at analyzing systems Siemens PLC s7-416 and OE-DM IZ. Coal consumption for kiln reheating is monitored by coal weight feeders described in Table 5. Responsible person collects data from meters on a daily basis. Afterwards the data are transferred to the energy department where they are processed and transferred to the financial department. Financial department is responsible for data storage in electronic and paper form.

Power consumption

Metering of power consumed for raw meal preparation and handling, operation of the kiln, including the auxiliaries and fuel handling is organized by 27 power meters (See table 6). All the data metered are transferred to the automatic control system of energy department where data are processed. From the energy department the data are transferred to financial department where they areprocessed using software "1C-Electricity" and stored in electronic and paper form.

CaO and MgO contents

CaO and MgO content in clinker and slurry is being periodically monitored by the use of chemical tests at the plant laboratory. The obtained data is transferred to the technology department where these data are stored and archived.

Raw meal consumption

The dry component of RM consumed for clinker production is calculated based on the quantity of clinker produced and special transition factor, representing amount of dry raw meal in the clinker , depending on characteristics of the raw meal. The daily sum data are collected and transferred to the technology department and financial department where these data are stored and archived.

Clinker production

Clinker production is calculated based on constant metering of raw meal volume supplied (measured by weight feeder of slag and flow meters of slurry) and characteristics of RM (moisture and chemical composition). Daily totals of clinker produced volumes are included in technology department daily reports. The data are transferred to the financial department where these are stored in electronic and paper form.

B.4. Special event log:

All special and exceptional events (critical equipment failures, reconstruction works, emergencies etc.) are documented by the special notes to the management of the company. The nature of the project and underlying operations does not foresee any factors that can cause unintended emissions due to emergencies. Possible emergencies can have impact on the continuation of operations (shutdowns) which will lead to a decreased number of ERUs which is, in turn, conservative.

SECTION C. Quality assurance and quality control measures

C.1. Documented procedures and management plan:

C.1.1. Roles and responsibilities:

Three departments of Yugcement will be responsible for collecting the information for monitoring purposes:

The laboratory of Yugcement
The laboratory of Yugcement is responsible for quality control of cement, clinker and raw components and performing their chemical analysis determining CaO and MgO content.

Energy department
The energy department is responsible for control of fuel and electricity consumption at Yugcement. This department is responsible for collecting and analyzing data from fuel meters. Also it collects data from the individual power meters installed at the production units that consume electricity, and the data of the commercial power meter that belongs to the regional power distribution company and measures the overall electricity consumption at the plant. The data from individual power meters is cross-checked with the data of the commercial meter. For the purposes of monitoring, the energy department will report electricity consumption level of the kiln system and the raw milling system, and provide it to the financial department.

Financial department
The financial department of the plant is responsible for accounting, controlling and planning. It will hold the overall responsibility for implementation of the monitoring plan, organizing and storing the data and providing necessary inputs for the calculation of the emission reductions. The financial department will also prepare the annual Monitoring Protocols, to be presented to a Verifier of the emission reductions. Other departments of Yugcement will submit relevant data to the financial department for the monitoring purposes. In addition to the preparation of the Annual Monitoring Protocols, the laboratory will conduct an internal audit annually to assess project performance and if necessary make corrective actions.

The general management of the monitoring team is implemented by the chief ecologist through coordinating activities. On-site day-to-day (operational) management is implemented by heads of corresponding units.

The data on fuel consumption as well as electricity consumption are collected in the department of chief energy officer and then transferred to the financial department.

The data of contents of CaO and MgO in clinker, ARM are collected in the plant laboratory that is certified for making analysis and supplied to the department of chief technologist. The data on raw meal consumption, clinker production, are collected in the department of chief technologist and together with the data from plant laboratory are supplied to the financial department.

Reporting procedures in place are approved by plant instructions which include, among others, daily collection and reporting of RM consumption, clinker and cement production, slag usage as raw material, fuels and power usage, chemical composition of RM, clinker and cement.

All data necessary for the CO_2 emission reductions calculation is collected in the ecology department by the chief ecologist. The calculation of emission reduction is made on a regular basis by Global-Carbon.
For this monitoring period the names of the personnel involved is as follows:

- Director of the plant;
- Production manager;
- Chief ecologist;
- Chief Process engineer;
- Chief energy officer;
- Head of laboratory;
- Head of maintenance;
- Head of mechanics;
- Financial department manager.

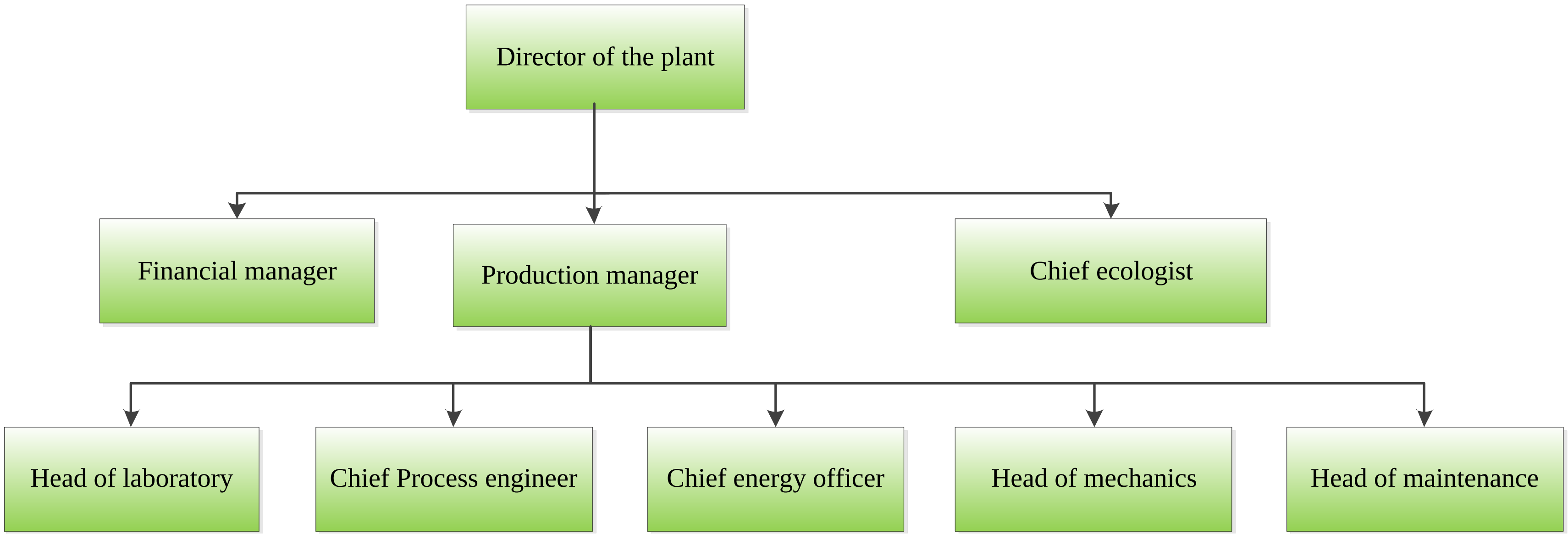

Figure 2: Positions and subordination

C.1.2. Trainings:

The personnel involved in maintenance and operation of equipment used has gone through safety and technical trainings necessary for correct operation. Special instruction was developed for ensuring professional development of plant workers. It is stated that workers can obtain internal (with experienced colleagues) or external (in educational centers) trainings. In case of external trainings the certificate is being issued after completion of the course. Internal trainings are carried out according to the schedule with resulting examination test.

C.2. Involvement of Third Parties:

The following third parties were involved in quality control and quality assurance during the monitoring period stated in the Section A.4:

The Ukrainian state body - Centre for Standardization and Metrology;
Coal SGS laboratory;
Natural gas laboratory of Kharkivtransgas.

C.3. Internal audits and control measures:

The internal quality system at Yugcement is functioning in accordance with the national standards and regulations in force. The quality of cement, clinker and all raw components is continuously controlled by the laboratory of the plant. The laboratory is certified by the Mykolayiv Regional State Metrology, Standardization and Accreditation Agency of Ukraine, certificate №PH-0032 /2010 from 08 April 2010.

The flows of materials (raw meal consumption, clinker production, cement production, slag consumption and other) are additionally audited by conducting of monthly inventory reports. This would allow for regular cross checking of values. All energy flows (electricity, coal and NG) are monitored by energy department.

C.4. Troubleshooting procedures:

Operational service is responsible for constant monitoring of device validity. In case of a of meter failure, it is being replaced by a similar meter. The consumption during meter failure period will be calculated using cross checking method. Operating hours, capacity, working load of equipment, data from other meters will be analyzed and used for estimations.

SECTION D. Calculation of GHG emission reductions

D.1. Table providing the formulae used:

Table 14: Formulae used for calculation in the Baseline scenario

Formula number from PDD	*Formula*	*Formula description*
Equation 1	$BE_y = BE_{Calcin,y} + BE_{FC,y} + BE_{EL,y} + BE_{Coal,y}$	Baseline emissions calculation (tCO2)
Equation 2	$BE_{Calcin,y} = \begin{pmatrix} 0.785 \times (CaO_{CLNK\_Bsl} \times CLNK_y - CaO_{RM\_Bsl} \times RM_y) + \\ +1.092 \times (MgO_{CLNK\_Bsl} \times CLNK_y - MgO_{RM\_Bsl} \times RM_y) \end{pmatrix}$	Baseline CO_2 emissions from calcinations of calcium carbonate and magnesium carbonate (tCO2)
Equation 3	$BE_{FC,y} = BKE_{BSL} \times \frac{\sum_i (FF_{fuel\_i,y} \times NCV_{fuel\_i,y} \times EF_{fuel\_i})}{\sum_i (FC_{fuel\_i,y} \times NCV_{fuel\_i,y})} \times CLNK_y$	Baseline emissions due to kiln fuel combustion (tCO2)
Equation 4	$BE_{EL,y} = EF_{el,y} \times EL_y \times CLNK_y$	Baseline emissions due to electricity consumption for preparation of raw meal and kilns electricity consumption in the year y (tCO_2)
Equation 5	$BE_{coal,y} = BE_{coal\_EL,y} + BE_{coal\_FC,y}$	Baseline emissions due to coal preparation (tCO2)
Equation 6	$BE_{coal\_el,y} = ELSP_{coalmill,y} \times FC_{coal\_BL,y} \times EF_{el,y}$	Baseline emissions due to electricity consumption for coal milling and conveying (tCO2)
Equation 7	$BE_{coal,FC,y} = \sum_i FSP_{heat\_gen,i,y} \times FC_{coal\_BL,y} \times EF_{fuel\_i,y}$	Baseline emissions due to fuel consumption by heat generator used for drying the coal in the year y (tCO_2)
Equation 8	$FC_{coal\_BL,y} = BKE_{BSL} \times CLNK_y$	Baseline consumption of coal by kilns in the year y (tons)

Table 15: Formulae used for calculation in the Project scenario

Formula number from PDD	***Formula***	***Formula description***
Equation 9	$PE_y = PE_{calc,y} + PE_{kiln,y} + PE_{El,y} + PE_{coal,y} + PE_{slag,y}$	Project emission in the year y (tCO_2)
Equation 10	$PE_{calc,y} = 0.785(CLNK_y \times CaO_{CLNK,y} - RM_y \times CaO_{RM,y}) +$ $+1.092(CLNK_y \times MgO_{CLNK,y} - RM_y \times MgO_{RM,y})$	Project emission due to calcinations in the year y (tCO_2)
Equation 11	$PE_{Kiln,y} = \sum_i FF_{fuel\_i,y} \times EF_{fuel\_i} \times NCV_{fuel\_i,y}$	Project emission from combustion of kiln fuels in the year y (tCO_2)
Equation 12	$PE_{El,y} = EF_{el,y} \times EL_y \times CLNK_y$	Project emission due to fuel and electricity consumption for raw meal preparation (drying, milling, handling) and kiln electricity consumption (tCO_2)
Equation 13	$PE_{coal,y} = PE_{coal\_electr,y} + PE_{coal\_fuel,y}$	Project emission due to kiln fuel (coal) preparation (grinding, drying, conveying) in the year y (tCO_2)
Equation 14	$PE_{coal\_electr,y} = EF_{el,y} \times EL_{Coalmill,y}$	Project emissions due to electricity consumption for coal milling and conveying (tCO_2)
Equation 15	$PE_{coal\_fuel,y} = EF_{fuel\_i} \times FC_{heat\_gen,y}$	Project emissions due to fuel consumption by heat generator used for drying the coal in the year y (tCO_2)
Equation 16	$PE_{slag,y} = EL_{slag,y} \times EF_{el,y} + FC_{slag,y} \times EF_{fuel\_i}$	Project emission due to slag preparation in the year y (tCO_2)

Table 16: Formulae used for calculation of emission reductions

Formula number from PDD	***Formula***	***Formula description***
Equation 25	$ER_y = BE_y - PE_y$	Emission reduction of the JI project in the year y (tCO_2e)

D.2. Description and consideration of measurement uncertainties and error propagation:

The uncertainties related to project activity data (RM consumption, clinker production, consumption of energy and fuel, and the chemical composition of materials) can be considered low as described in IPCC Volume 3, Chapter 2 (mineral industry emissions), 2.2.2 Uncertainty assessment[10].

D.3. GHG emission reductions (referring to B.2. of this document):

D.3.1. Project emissions:

Amount of GHG emissions of the Project scenario during the monitoring period is shown in a table below:

Table 17: Project emissions

Formula number from PDD	**Project emissions PE_y**	**2009**	**2010**	**2011[11]**
Equation 10	From calcination $PE_{calc,y}$	247719	260636	57287
Equation 11	From kiln fuel combustion $PE_{kiln,y}$	147947	243899	63239
Equation 12	From electricity consumption $PE_{EL,y}$	34994	38088	10141
Equation 14	Due to power consumption for coal preparation $PE_{coal\_electr,y}$	0	998	353
Equation 15	Due to fuel combustion for coal preparation $PE_{coal\_fuel,y}$	0	1645	650
Equation 16	From slag preparation $PE_{slag,y}$	217	30	39
Equation 9	Total for the year	**430877**	**545296**	**131709**
	Total for the monitoring period		**1107882**	

[10] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_2_Ch2_Mineral_Industry.pdf

[11] From 01.01.2011 to 31.03.2011

D.3.2. Baseline emissions:

Amount of GHG emissions of the Baseline scenario during the monitoring period is shown in a table below:

Table 18: Baseline emissions

Formula number from PDD	Baseline emissions BE_y	2009	2010	2011[11]
Equation 2	From calcination $BE_{calc,y}$	250538	261545	57887
Equation 3	From kiln fuel combustion $BE_{FC,y}$	160661	242697	64674
Equation 4	From electricity consumption $BE_{EL,y}$	34994	38088	10141
Equation 6	Due to power consumption for coal preparation $BE_{coal\_electr,y}$	0	998	353
Equation 7	Due to fuel combustion for coal preparation $BE_{coal\_fuel,y}$	0	2755	674
Equation 1	Total for the year	**446193**	**546083**	**133729**
	Total for the monitoring period	**1126005**		

D.3.3. Leakage:

No leakage occurs. Not applicable.

D.3.4. Summary for the emission reductions during the monitoring period:

Table 19: Emission reductions

Formula number from PDD	**Emission reduction**	**2009**	**2010**	**2011[12]**
Equation 25	ER y, tCO2	15316	787	2020
	Total for the monitoring period	**18123**		

[12] From 01.01.2011 to 31.03.2011

Annex 1

Definitions and acronyms

Acronyms:

ACS	Automatic control system
ARM	Alternative raw materials
BFS	Blast furnace slag
CDM	Clear Development Mechanism
CO_2	Carbon Dioxide
ERU	Emission Reduction Units
GHG	Greenhouse Gases
GJ	Gigajoule
IPCC	Intergovermental Panel on Climate Change
JISC	Joint Implementation Supervisory Committee
MWH	Megawatt Hour
NCV	Net calorific value
NG	Natural gas
PDD	Project Design Document
RM	Raw meal

Definitions:

Baseline	The scenario that reasonably represents what would have happened to greenhouse gases in the absence of the proposed project, and covers emissions from all gases, sectors and source categories listed in Annex A of the Protocol and anthropogenic Removals by sinks, within the project boundary.
Emissions reductions (ER)	Emissions reductions generated by a JI project that have not undergone a verification or determination process as specified under the JI guidelines, but are contracted for purchase.
Greenhouse gas (GHG)	A gas that contributes to climate change. The greenhouse gases included in the Kyoto Protocol are: carbon dioxide (CO2), Methane (CH4), Nitrous Oxide (N2O), Hydrofluorcarbons (HFCs), Perfluorcarbons (PFCs) and Sulphurhexafluoride (SF6).
Joint Implementation (JI)	Mechanism established under Article 6 of the Kyoto Protocol. JI provides Annex I countries or their companies the ability to jointly implement greenhouse gas emissions reduction or sequestration projects that generate Emissions Reduction Units.
Monitoring plan (MP)	Plan describing how monitoring of emission reductions will be undertaken. The monitoring plan forms a part of the Project Design Document (PDD).