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

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SECTION A. General description of the project

A.1. Title of the project:

New dry cement line installation at OJSC " Sukholozhskcement", Sverdlovsk area, Russia

Sectoral scope 4: Manufacturing industries[1]

Project design document (PDD) version 1.9

26 October 2009

A.2. Description of the project:

Description of the enterprise

OJSC Sukholozhskcement (Sukholozhskcement further in the text) was established in 1992 as a legal successor of Novosukholozhsky cement plant started in 1972. It has been fully controlled by the German cement producer Dyckerhoff AG since 1994. It is the eighth biggest cement producer in Russia and the largest cement plant in the Urals with annual capacity of 2.6 million tonnes of cement. Cement production on four wet rotary kilns amounted to 2.3 million tonnes cement or 4.2% of total cement production in Russia in 2008. 90% consumers are located in Sverdlovsk and Tyumen area.

The plant produces grey cement for construction industry and oil industry for oil wells cementing. Quality of cement produced is the best in Urals region and is confirmed by a license provided by the American Petroleum Institute and an international audit on compliance with ISO 9002-96 and ISO 9001 -2001.

Project purpose

The goal of this proposed Joint Implementation (JI) project is to apply more energy efficient dry process of cement production and thus significantly reduce emissions associated with clinker production by construction a new dry cement production line with annual capacity of 1.3 million tonnes of cement.

Cement production is a highly energy intensive process generating significant emissions of greenhouse gases (GHGs), in particular CO_2. There are three main sources of CO_2 emissions in the cement production process. The first source is chemical decomposition of limestone into calcium oxide and carbon dioxide. The second source is fossil fuel combustion. The third source, being smaller compared to first two, is the electricity consumption by the plant's motor drives (e.g. for kiln rotation, pumping, ventilation) and other electrical equipment. This project will affect the second and the third source of emissions.

Current status

Sukholozhskcement has four wet kilns. Average specific energy consumption from fossil fuel combustion is about 5,647 MJ per tonne of clinker. Present production of cement is about 2.3 million tonnes of cement per year. These kilns were constructed in 1972-1975. Proper maintenance and full repair combined with proper financing raise the reasonable expectations, that existing wet kilns will operate at least 2020. Operating of this type of equipment for such a long period of time is a common practice in Russia[2].

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[1] http://ji.unfccc.int/Ref/Documents/List_Sectoral_Scopes_version_02.pdf

[2] In Russia there are some kilns which are being operated for more than 45 years without renovation and nearly 60 years with renovation

Natural gas is being used as a fuel at Sukholozhskcement. It is a typical fuel at Russian cement plants, except cement plants in Siberia, as it is cheaper and cleaner than heavy oil fuel and coal. Coal may become an alternative fuel if gas prices will make switch from natural gas to heavy oil fuel or coal economically reasonable.

Wet cement production technology is the conventional technology of cement production in Russia, while dry production technology has a very limited number of applications in the country. The dry method is used at 17 % of kilns in Russia. Only three percent of dry kilns are located in Urals region[3]. Therefore wet process is the predominant technology in Russia. All kilns were constructed before 1992 and some of them were renovated during 1970-2000. Only three new plants have been constructed in Russia since 1992, they are placed:

- in the Central part of Russia: one dry kiln on gas at OJSC Mordovcement (Komsomolskiy, Mordoviya republic, 2008);
- in Urals region:
    - two dry kilns on gas at OJSC Soda (Sterlitomak, Bashkortostan republic, 2007);
    - one wet kiln on gas at OJSC Magnitogorskiy cementno-ogneuporniy plant (Magnitogorsk, Chelyabinsk area, 2007).

Current process of cement production

The cement production process at Sukholozhskcement is presented in Figure A.2.2 below. Four wet rotary kilns are in operation. Cement production at the plant comprises the following five stages:
1. Extraction of raw materials;
2. Raw milling - preparation of raw materials for the pyroprocessing system;
3. Pyroprocessing - pyroprocessing raw materials to form cement clinker;
4. Clinker storage;
5. Finish milling.

1. **Extraction of raw materials.** Raw materials required for manufacturing (limestone, argillite and tripel) are being extracted at the Kunarsk, Novosuhologsk and Kurinsk quarries. Extracted raw materials are transported to the plant by dump trucks (Belaz, Kraz);
2. **Raw milling.** After extraction raw materials are dosed in the right proportion into the mill for milling. Water is added in the mill to form slurry. Slurry is directed into a slurry basins for averaging and achieving proper chemical composition. There are four 3.2 meters diameter mills and four 4.0 meters diameter mills at the plant. There are four slurry basins at the plant. Each slurry basin volume is 5700 m^3;
3. **Pyroprocessing.** In pyroprocessing, slurry is heated to produce cement clinker. Clinker represents a hard, gray, spherical granules with diameters ranging from 0.32 - 5.0 cm, they are created by chemical reactions between raw materials. Pyroprocessing system consists of three steps: drying (or preheating), calcining (a heating process in which calcium oxide is formed), and burning (sintering). The pyroprocessing takes place in the rotary kiln. There are four rotary kilns 185 meters length and 5.0-5.6 meters in diameter;
4. **Clinker storage** Cooled clinker is directed to a clinker silage by a conveyor line to the finish milling;
5. **Finish Milling.** During the finish milling clinker is milled in certain proportions with additives (gypsum, granulated slag, tripel, limestone) to generate cement. There are six cement mills at the plant. Produced cement is directed to a cement storage silages. Cement is loaded into the

[3] This and further information on cement plants is taken from annual reports of OJSC NII Cement (Cement Research Studies Institute), "Russian cement industry in 2006", 2007. Annual report of this institutewill be used also for monitoring purposes.

transportation carriages, cement bulk trucks, and also packed into a big-bags (special storage accessory).

Project scenario

A new dry cement production line is to be constructed in close proximity of the existing manufacturing plant (around two km). The new production line will be next to the existing production, and will have its own infrastructure, railway ramps, engineering facilities. Total cement production (after the project) will consist of existing wet lines and a new dry line. Annual cement production of the new line is about 1.3 million tonnes. According to the project, existing wet lines production will be reduced to 1.0 million tonnes of cement after the new dry line start up. More detailed information about dry cement production process and JI construction project is presented in Section A.4.2.
The main benefit of the dry cement production process is the decreased fuel consumption and therefore generation of CO_2 emissions reduction. Average specific energy consumption for the dry cement production process is 3,310 MJ per tonne of clinker produced versus 5,647 MJ for wet process technology. Thus less volume of natural gas is required to be combusted in rotary kiln.

Baseline scenario

In the baseline scenario it is assumed that all cement produced in line with the project scenario would otherwise have been produced on the existing wet kiln. However there is a limitation on the production capacity of the existing wet kilns and, depending on the actual monitored production in the project scenario, third party cement producer would have produced the remaining part. Baseline and project capacity are presented in the Figure A.2.1. Average existing annual cement production (wet lines) is about 2.3 million tonnes for the last three years. Plant technical capacity (wet lines) is about 2.6 million tonnes of cement (2.27 million tonnes of clinker). In case of the project absence and increased market cement demand, existing wet production can reach its technical capacity: 2.6 million tonnes of cement or 2.27 million tonnes of clinker. Existing production is to be reduced from 2.3 million tonnes of cement a year to 1 million tonnes a year (after new cement line construction) with possibility of recovery to 2.6 million tonnes year if required. Planned total annual project cement production is 2.3 million tonnes of cement (1 million tonnes to be manufactured by existing wet lines and 1.3 million tonnes to be manufactured by the new dry cement line).

In this case the project will consist of existing (operating with reduced production) and replacement (new) production. In case of increased market cement demand, annual production of existing wet lines will exceed 1 million tonnes of cement. Potential total annual project production is 3.9 million tonnes. Potential total annual project cement production is a sum of existing (2.6 million tonnes a year) and new (1.3 million tonnes a year) technical production capacities. If total project cement production is higher than 2.6 million tonnes, the project will have incremental production. Thus CO_2 emissions in the baseline scenario consist of two parts: the existing capacity and the incremental capacity (the incremental capacity assumed zero if total annual project production volume is less than 2.6 tonnes of cement). Emissions associated with incremental capacity are calculated based on the other cement producers emissions. If the project is not implemented, market demand will be covered by incremental capacity of the other cement manufacturers. Also market demand will be satisfied by increasing cement production by the other cement manufacturers existing capacities by increasing the number of run-days, decreasing duration of stops or new capacities installation.

Figure A.2.1: Baseline and project capacity

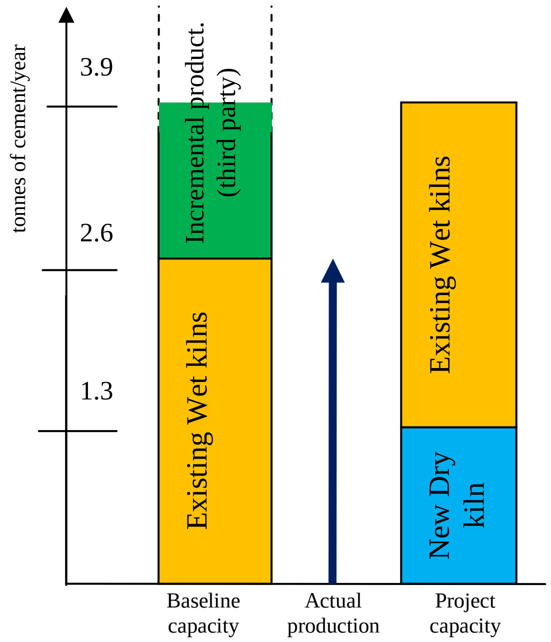
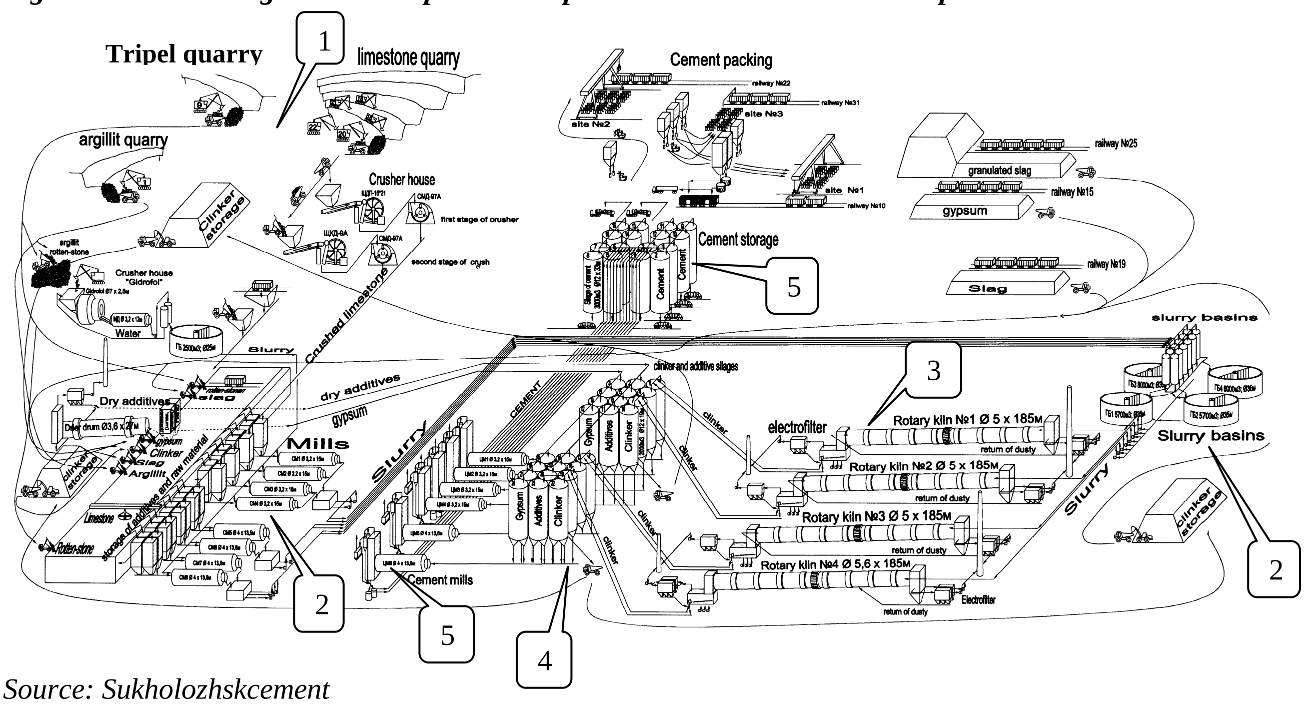


Figure A.2.2: Existing wet cement production process at Sukholozhskcement plant



Source: Sukholozhskcement

Project background and description

The Board of Directors of Sukholozhskcement with Dyckerhoff AG decided to conduct a feasibility study on the new dry cement production line at Sukholozhskcement in February 2006. Sukholozhskcement signed a contract with OJSC "Sibniiproektcement" for development of the detailed project design in September 2006. Sukholozhskcement started building of a new dry line of cement production in Sukhoy-

Log (preparation of site) on 23 January 2007. Glavgosexpertiza of Russian Federation approved the design documents in January 2008.

The project consists of two stages. The first stage includes construction of crusher plant, pre-blending storage, drying and grinding equipment, kiln and clinker storage. This stage has been completed. The second stage covers installation of cement mills, additives storage, cement silages, transporting equipment, carriages defrost equipment. Second stage is planned to be finished in August 2010. Project implementation schedule is presented in Section A.4.2. below.

Project's Contribution to Sustainable Development

The project contributes to the sustainable development of Sverdlovsk area of Russia in four ways:

Social benefits: New cement line construction requires skilled professionals and modern technologies in place. The project will create workplaces in construction, equipment maintenance and equipment operating areas. Workforce, indirectly associated with the given project, will also be required. Labour market will benefit due to the project implementation. Roughly, a hundred workplaces will be created. Job contract duration will start from 36 month (construction period). After proper training, a part of the current staff will be reallocated to the new line after production reduction at the old lines.

One of the priority tasks for Russian regions is the infrastructure development. Cement required for infrastructure construction will inspire increase in cement production. Newly built highways and railroads will require maintenance technicians and the other operating staff. These additional factors create options for investments, thus giving the project an extra business opportunity.

Economic benefits: One of the tasks stressed by Russian Government to industrial manufacturers in Russia is innovative industry development and resource and energy-saving technologies introduction. Project scope proposes natural gas saving technology. Less natural gas will be consumed thus preserving non-renewable fuels. Operation costs will be reduced making the plant more competitive.

Environmental benefits: Dry cement production technologies wide spread in developed countries will be introduced. Local air pollution will be significantly lower compared to the old wet process (see Section F.1).

Technological: The proposed dry cement production technology is relatively new for Russia and the property rights of the technology lie solely with the foreign technology licensor. A vital part of the project will be to provide appropriate training to the managerial and operational staff of Sukholozhskcementt. An intensive in-house knowledge base will be developed to build up scientific and technical expertise for running the process. Adoption of this technology also contributes to capacity building of the enterprise staff by stronger exposure to modern technological developments in the cement industry. Moreover, this technology can be replicated by other cement producers in Russia.

A.3. 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)
Party A: Russia (Host party)	OJSC Sukholozhskcement	No
Party B: Germany	Dyckerhoff AG	No
Party C: The Netherlands	Global Carbon BV	No

Role of the project participants:

- OJSC "Sukholozhskcement" is one of the leading cement plants in Ural region of Russia. Sukholozhskcement will implement the JI project including the monitoring phase. Sukholozhskcement is a project participant;
- Dyckerhoff Group consists of Dyckerhoff AG, which operates in Germany, and its Group companies in Germany, Luxembourg, the Netherlands, Poland, the Czech Republic and Slovakia, Ukraine, Russia, and the USA. The core businesses of Dyckerhoff AG and its subsidiaries encompass production and sale of cement and ready-mixed concrete; these core businesses are integrated in Germany / Western Europe, Eastern Europe, and USA divisions. Dyckerhoff AG holds a majority interest (around 73 %) in OJSC " Sukholozhskcement". It will invest in JI project implementation and own ERUs generated. Dyckerhoff is a project participant;
- Global Carbon BV is a leading expert on environmental consultancy and financial brokerage services in the international greenhouse emissions trading market under the Kyoto Protocol. Global Carbon has developed the first JI project that has been registered at the United Nations Framework Convention on Climate Change (UNFCCC). The first verification under JI mechanism was also completed for Global Carbon B.V project The company focuses on Joint Implementation (JI) project development in Bulgaria, Ukraine, Russia and the EU Emissions Trading Scheme. Global Carbon BV is responsible for the preparation of the investment project as a JI project including PDD preparation, obtaining Party approvals, monitoring and transfer of ERUs. Global Carbon BV is a project participant.

Management company:

- Buzzi Unicem SpA is an international multi-regional, heavy-side group, focused on cement, ready-mix and aggregates controlling 23 construction materials producers in 12 countries. It holds 88% of the Dyckerhoff total capital stock. To highlight the affiliation to the Buzzi Unicem Group the Buzzi Unicem logo is placed before the name of Dyckerhoff and all its Group companies. Buzzi Unicem and Dyckerhoff AG will supply the main equipment for the project. Buzzi Unicem SpA is not a project participant.

A.4. Technical description of the project:

A.4.1. Location of the project:

Sukholozhskcement is located in Sukhoy-Log town 114 km to the East from Ekaterinburg (see Figure A.4.1.2), capital of Sverdlovsk area.
Geographical location of Sverdlovsk area and Sukhoy-Log are presented in Figure A.4.1.1 and Figure A.4.1.2 below.

Figure A.4.1.1: Map of Russia with location of Sverdlovsk region (selected by red colour)

Source: http://en.wikipedia.org/wiki/File:Map_of_Russia_-_Sverdlovsk_Oblast_(2008-03).svg

Figure A.4.1.2: Map of Ural region with the project location

Source: http://www.mapquest.com/

A.4.1.1. Host Party(ies):

The Russian Federation

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

Sverdlovsk area is located in the centre of Urals. After Moscow, Tyumen area, Moscow area and Sankt Petersburg it is the fifth biggest gross regional product (GRP) producer in Russia contributing 3% of the Russian gross domestic product (GDP). Its population amounted to 4.4 million in 2008 that corresponds to 3.1% of the total Russian population. It has developed ferrous (13% of steel and 12% of rolled metal in Russia) and non-ferrous (copper, aluminum, nickel) metallurgy, highly diversified machinery building and chemistry, military and durable consumer goods production, wood processing, construction materials and light industry. The area is rich in iron and copper ore, asbestos, bauxites, has coal and gold extraction. It is almost fully supplied with gas. Nevyansky cement is the second biggest cement producer and the only competitor of Sukholozhskcement in the area with annual capacity of 1.1 million tonnes of cement.

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

Sukhoy-Log population amounted to 35.2 thousand in 2008. The town's economy is based on four main enterprises (non-ferrous metallurgy and construction materials) inclusive Sukholozhskcement. The industrial output dropped by 33% in 2008. Unemployment rate reached 3.8%. The average salary is RUR 14 thousand. Rank of the town economic development is 66 out of 68 in Sverdlovsk area. Sukholozhskcement employs more than 1400 people that amounts to 23% of Sukhoy-Log labour force thus proving its important local social and economic role.

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

The Sukholozhskcement production site is located at the southeast outskirts of Sukhoy-Log town (see Figure A.4.1.4.1). The site coordinates are: 62° 1' 35" E longitude, 56° 54' 51" N latitude.

Figure A.4.1.4.1: Satellite image of Sukhoy-Log town with Sukholozhskcement plant

Source: http://maps.google.com/maps?hl=en&tab=wl

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

The proposed JI project aims at construction of the new dry cement production line which will use more energy-efficient dry process of cement production than the existing one. Main technical data of the existing wet lines cement production and the planned dry line cement production are presented in Table A.4.2.1 below.

Table A.4.2.1: Main technical data of existing plant and planned JI project

Indicator	Unit	Technical capacity of existing wet lines	Wet lines average production	Planned dry line production
Cement production capacity	tonnes/year	2,600,000	2,301,148	1,300,000
Clinker production capacity	tonnes/year	2,270,000	2,004,250	1,088,000
Amount of kilns	items	4	4	1
Clinker / cement factor	numerical	0.87	0.87	0.84
Specific natural gas consumption (clinker production)	MJ/t clinker	-	5,647	3,310
Specific consumption of electrical energy	kWh/t cement	-	134	106

Source: Sukholozhskcement

Wet process production is described in Section A.2. Major difference between dry cement production and wet process is as follows:

- water is not added in to the raw mill during milling ;
- dry raw meal is fed into the kiln instead of slurry, allowing avoid water evaporation;
- energy is being saved.

Dry process is described in details below.

General description of dry cement technology

The raw materials for the new cement line will be supplied from the existing quarries. But some additional auxiliary equipment will be installed e.g. in the quarries. The extracted raw materials will be transported to the new cement line by the old and new dump trucks. The quarries are located at 0.5 to 3.5 km from project site. Proven raw materials reserves are presented in the Table A.4.2.2 below.

Table A.4.2.2: Proven raw materials reserves

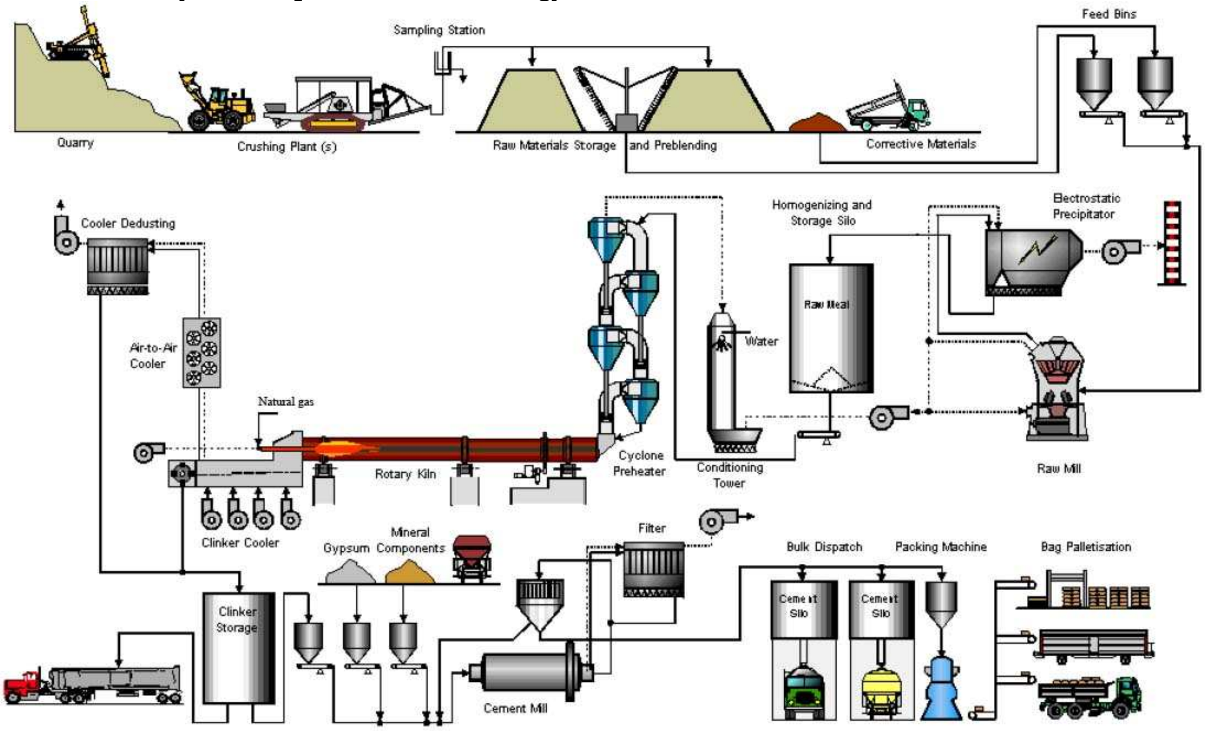
Raw material	Unit	Period
Limestone	year	42
Argillite	year	105
Tripel	year	53

Source: Sukholozhskcement

Dry process of grey cement production is presented in Figure A.4.2.3 below. The new cement line will produce the following cement brands: PC[4]-400-D0 (88 thousand tonnes per year), PC-400-D20 (765 thousand tonnes per year) and PC-500-D0 (447 thousand tonnes per year). New crusher plant will be constructed 0.3 kilometers from Kunarsk quarry. Ore will be transported there by dump trucks. There it is mixed and crushed in a required proportion. A single stage impact crusher is used for raw material crushing. Crushed raw materials are transported to an integrated pre-blending storage. Then raw meal is prepared by drying and grinding of raw material components in mills. Hot kiln exhaust gases are utilized for drying.

In the pre-heater kilns, raw meal is fed to the top of a series of cyclones passing down in stepwise counter-current flow with hot exhaust gases from the rotary kiln, thus providing intimate contact and efficient heat exchange between solid particles and hot gas. Cyclones thereby serve as the separators between solids and gas.

Figure A.4.2.3: Dry cement production technology



Source: Cembureau, Best available techniques for the cement industry (1999)

Prior to entering rotary kiln, raw meal is heated up approximately to 810 – 830 °C, whereby calcination (i.e. also release of CO_2 from the carbonates) is already about 30% complete. Exhaust gases leave the pre-heater at 300 – 360° C temperature and are further utilised for raw material drying in the raw mill. In the rotary kiln, calcium carbonate is fully calcinated into calcium oxide and carbon dioxide:

$$CaCO_3 + heat \Rightarrow CaO + CO_2 \qquad (1)$$

This chemical reaction is one of the three main sources of carbon dioxide emissions during cement production. The second main source of CO_2 emissions is the fuel burning in order to heat the kiln.

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[4] Portland Cement

After calcination, calcium oxide reacts with the other chemical compounds present at temperatures between 1400 – 1450°C.

$$3CaO + SiO_2 \Rightarrow 3CaO \cdot SiO_2 \qquad (2)$$

$$2CaO + SiO_2 \Rightarrow 2CaO \cdot SiO_2 \qquad (3)$$

$$3CaO + Al_2O_3 \Rightarrow 3CaO \cdot Al_2O_3 \qquad (4)$$

$$4CaO + Al_2O_3 + Fe_2O_3 \Rightarrow 4CaO \cdot Al_2O_3 \cdot Fe_2O_3 \qquad (5)$$

These reactions are called sintering. The final product of these reactions is called clinker. A part of calcium oxide does not react with anything. This calcium oxide is called free.

Clinker that comes out of the kiln is cooled and heat is returned to the process by clinker coolers. Last stage of the cement production is fine crushing of clinker in cement mills to the state of powder. Mineral components (e.g. slag, gypsum) are added to the clinker and milled together in order to produce different types of cement.
Annual production of the new dry installation will be approximately 1,088,000 tonnes of clinker or approximately 1.3 million tonnes of cement per year.
According to the schedule, the new grey cement line will be commissioned in August 2010. The project implementation schedule is presented in Table A.4.2.3 below.

Table A.4.2.3: Project implementation schedule

N	Title	2006		2007				2008				2009				2010		
		III q	IV q	I q	II q	III q	IV q	I q	II q	III q	IV q	I q	II q	III q	IV q	I q	II q	III q
1	Public consultations																	
2	Site preparation																	
3	State expertise (two stages)																	
4	First stage, construction following units: • crusher plant; • pre-blending storage; • drying and grinding house; • kiln house; • clinker storage.																	
5	Second stage, construction following units: • cement mill house; • storage of additives; • drying of additives; • cement storage; • belt conveyors.																	
6	Commissioning																	

Source: Sukholozhskcement

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:

More energy-efficient dry process of cement production is introduced. Low energy-efficient capacity of existing old plant is to be reduced. Thus emissions reductions of CO_2 will occur, particularly, due to a reduction of the kiln fuel consumption as a result of enhanced energy consumption. New technology is environmental friendly compared to the old one.

OJSC Sibniiproektcement proved that pollutants concentration is within permitted concentration limits. See Section F for detailed description.

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

Estimated amount of emission reductions are presented in the Table A.4.3.1.1 and Table A.4.3.1.2. More detailed calculation of emission reductions is described in Section E.

Table A.4.3.1.1: Estimated emission reductions over the crediting period

	Years
Length of the crediting period	2.42
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
2010	90,375
2011	202,565
2012	202,565
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	495,506
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	165,169

Table A.4.3.1.2: Estimated emission reductions after the crediting period

	Years
Period after 2012, for which emission reductions are estimated	8
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
2013	202,565
2014	202,565
2015	202,565
2016	202,565
2017	202,565
2018	202,565
2019	202,565
2020	202,565
Total estimated emission reductions over the period indicated (tonnes of CO2 equivalent)	1,620,523
Annual average of estimated emission reductions over the period indicated (tonnes of CO2 equivalent)	202,565

A.5. Project approval by the Parties involved:

After the PDD passed the determination process, the PDD and determination report and other required documents will be presented to Russian designated focal point for approval of the proposed JI project. Additionally, project approvals from investor country(ies) will be applied for.

SECTION B. Baseline

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

A baseline for the JI project has to be set in accordance with Appendix B of the Annex to decision 9/CMP.1 (JI guidelines), and with the "Guidance on criteria for baseline setting and monitoring"[5] developed by the Joint Implementation Supervisory Committee (JISC) (hereinafter referred to as "Guidance"). In accordance with this Guidance, the project participants may apply approved CDM baseline and monitoring methodologies (paragraph 20 (a) of the Guidance) or they can establish a baseline in accordance with Appendix B of the JI guidelines, while also using selected elements or combinations of approved CDM baseline and monitoring methodologies as appropriate (paragraph 20 (b) of the Guidance).

Four approved CDM baseline and monitoring methodologies are relevant for cement industry: ACM0003, ACM0005, ACM0015 (consolidating AM0033 and AM0040) and AM0024. None of these methodologies can be applied directly to the project which foresees a process switch combined with an increase in production, but these methodologies have been carefully studied to identify the main principles underlying the approach to baseline setting, additionality and monitoring.

Furthermore, approach regarding baseline setting applied for the JI project "Switch from wet-to-dry process at Podilsky Cement, Ukraine" (JI Track 2[6] reference number: 0001), for which the determination has been deemed final, is taken into account with respect to production at the maximum technical capacity.

On this basis, a JI specific approach regarding baseline setting and monitoring has been developed in accordance with Appendix B of the JI Guidelines and the JISC's Guidance.

Approach to select the baseline scenario
The baseline is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project[7]. As no approved CDM baseline and monitoring methodology can be directly applied, plausible future scenarios are identified and listed on the basis of conservative assumptions (paragraph 21 (b) of the Guidance). The proposed project, not developed as a JI project, has been included as one of the alternatives. These alternatives are assessed as credible or plausible, and the most plausible is identified as the baseline. Consistency between the baseline scenario determination and additionality determination has been checked.

The approach described above has been used to identify the baseline scenario for Sukholozhskcement.

[5] http://ji.unfccc.int/Ref/Guida.html

[6] The verification procedure under the JISC, as defined in paragraphs 30-45 of the JI guidelines, is also referred to as "Track 2 procedure".

[7] JI guidelines, appendix B

Step1: Identification and listing of plausible alternative baseline scenarios

Sukholozhskcement has been producing cement by applying wet process since the very beginning. Wet process was the predominant technology in the Soviet Union. Only two out of the ten nearest cement plants use dry process. The main reason to use the wet process was the simplicity of raw material handling and the control of the cement quality. Energy efficiency was not considered to be a high priority at that time.

The baseline assumptions are based on the current situation in the region and industry while investment analysis is to be implemented as at the moment of taking the decision on project (i.e. 2006). At that time the residential construction boom created the deficit of cement capacities and resulted in jumping prices especially during the high season. The market situation pushed the cement producers to make the investment decisions on creating new capacities based on the best available technologies available (i.e. dry cement production on gas). The economic and financial crisis of 2008 resulted in limited borrowing resources available both for residential construction and investment funding in cement industry. Most of investment plans of the leading cement producers were delayed to two–four years. Thus the justification and selection of alternative scenarios as well as common practice analysis presented below are based on current situation in the Russian economy while investment analysis is 2006 reality based.

At Sukholozhskcement seven options for the cement production are technically feasible and discussed below. The basic principle applied is that the demand for cement in the region is not influenced by the project and is identical in the project and baseline scenario. This means that, depending on the actual production in the project scenario, there are different options whether in the baseline scenario this production is produced on-site or by surrounding cement plants.

Production capacity:

a. Production at the existing cement lines (wet) will continue. The nearest cement plants will satisfy any remaining cement demand;
b. Operation of the existing cement production lines and construction of a new cement production line;
c. Construction of several new cement production lines (number of new lines depends on required plant production rate) and all existing cement production lines decommissioning;
d. Construction of new cement production line and reduction in capacity of existing cement production lines.

Cement technology for new cement production lines:

e. Wet process;
f. Semi-dry process;
g. Dry process.

Combining the seven options, mentioned above, results in seven possible alternative baseline scenarios:

Alternative 1: Operating the existing cement (wet) lines. The nearest cement plants will produce the remaining cement demand;
Alternative 2: Operating the existing cement (wet) lines and constructing a new line applying a wet process of cement production;
Alternative 3: Operating the existing cement (wet) lines and constructing a new line applying a semi-dry process of cement production;
Alternative 4: Operating the existing cement (wet) lines and constructing a new line applying a dry process of cement production;
Alternative 5: Decommissioning existing (wet) lines and building of new lines applying dry process;
Alternative 6: Decommissioning existing (wet) lines and building of new lines applying semi-dry process.

These six alternatives are described below in more detail.

1) Operating the existing cement (wet) lines. The nearest cement plants will produce the remaining cement demand

Annual cement production of the existing capacity will be approximately 2.6 million tonnes per year. The incremental production from zero to 1.3 million tonnes of cement (it depends on demand for cement) will be covered by other (new and/or existing) cement plants. Existing four wet kilns will operate at its maximum output (about 2.34 million tonnes of clinker per year). Equipment will perform in line with its technical specifications.

2) Operating the existing cement (wet) lines and constructing a new line applying a wet process of cement production

Total annual cement production will be about 3.9 million tonnes. Capacity of the new wet line (incremental cement production) will be approximately 1.3 million tonnes. The cement production of by the existing capacity will be about 2.6 million tonnes per year. In this case, volume of natural gas consumption will be biggest out of all alternatives. But in case of reduced demand for cement, the incremental capacity and production of old wet lines will reduced too.

3) Operating the existing cement (wet) lines and constructing a new line applying a semi-dry process of cement production

This alternative is the same as the alternative 2 above, but the new cement production line will use the semi-dry process of cement production. But in this case, volume of natural gas consumption will be less than alternative 2 therefore less content of moisture in raw materials.

4) Operating the existing cement (wet) lines and constructing a new line applying a dry process of cement production

This alternative is the same as alternatives 2 and 3 mentioned above, but the new cement production line will use the dry method. In this alternative natural gas consumption will be minimum out of alternatives 1,2,3 thus emission of CO_2 will be the smallest too.

5) Decommissioning existing (wet) lines and building of new lines applying dry process

In this scenario the new dry lines will be built at the same site to replace the existing wet lines, which will be mothballed or demolished. Annual new lines capacity will be approximately 3.9 million tonnes of cement. Wet process and dry process of cement production have different process of raw material milling (slurry and meal) for kiln feed. If the different types of kilns are to be constructed this will require the. new mill department.

6) Decommissioning existing (wet) lines and building of new lines applying semi-dry process

This alternative is the same as alternative 5 above, but the semi-dry method will be applied in the new cement production line

Step 2: Identification of the most plausible alternative scenario

Assessment of alternative 1: Operating the existing cement (wet) lines. The nearest cement plants will produce the remaining cement demand

The wet process of cement production is widespread in Russia. Only two plants use dry process among ten nearest cement plants. The existing cement production lines can be operated until at least 2020. The expected operation does not require significant investment. There are no legal or other requirements that enforce Sukholozhskcement to stop application of the wet production process. Other cement plants have possibility to increase cement production as they usually do not work at full technical capacity (example: The technical capacity of the existing Sukholozhskcement is 2.6 million tonnes of cement per year). Also new plant can be built in Ural region to cover cement market demand. Thus, alternative 1 is a reasonable and a feasible one.

Assessment of alternative 2: Operating the existing cement (wet) lines and constructing a new line applying a wet process of cement production

The new cement line that uses wet process will be operated together with the existing wet lines. Thus the wet process has already been used on-site, it is well known, and its replication will not face technical and staff training difficulties. However, wet kiln is an out-dated technology with high specific energy consumption per tonne of clinker produced, but investment cost for new wet, semi-dry and dry line is almost the same. Given the fact that energy prices are constantly rising, the reinforced application of this technology will lead to high (and increasing) cement production costs. Also increase of existing equipment productivity is easier than construction of a new cement plant which has a small capacity, because new infrastructure will be needed. Thus this alternative cannot be considered as a reasonable and feasible alternative. Moreover, this alternative is not conservative in terms of greenhouse gas emissions.

Assessment of alternative 3: Operating the existing cement (wet) lines and constructing a new line applying a semi-dry process of cement production

The semi-dry method is usually applied if the moisture content of the raw material is more than 25 %. A weighted average moisture content of the raw materials used by Sukholozhskcement is about 3.3 % (limestone - 1.28%; tripel – 40.9%; argillite – 7.22%). Therefore there is no sense to apply this method.

Assessment of alternative 4: Operating the existing cement (wet) lines and constructing a new line applying a dry process of cement production

New production line will produce approximately 1.3 million tonnes of cement per year. Building a new dry line cement production requires significant investment, but, after project implementation, cement production cost, will be significantly lower. Therefore, in case of reduced demand for cement, it is unlikely that the existing cement wet lines will be used fully as its cement production cost is higher. In this case total cement capacity may be adjusted to the capacity reduction of old lines. Thus this alternative is flexible, because this situation is realistic and cement production depends on the demand for cement. In principle, this alternative is a reasonable and feasible one.

Assessment of alternative 5: Decommissioning existing (wet) lines and building of new lines applying dry process

If all existing kilns are to be decommissioned then to cover the production level of 3.9 million tonnes of cement three new dry lines of 1,3 million each should be built each of them requiring the new infrastructure. Thus the investment cost is tripled to around 777 million euro that is not realistic for the company to borrow or finance on their own in the current economic situation. Thus this alternative can not be considered as reasonable and feasible one.

Assessment of alternative 6: Decommissioning existing (wet) lines and building of new lines applying semi-dry process

This alternative is the same as alternative 5 above, but the new cement production lines will apply the semi-dry method.

Conclusions

Only alternatives 1 and 4 are, in general, realistic and credible. However, alternative 4 is economically/financially not feasible. This is proven in Section B.2 below, by applying an investment analysis in accordance with the approved CDM "Tool for the demonstration and assessment of additionality" (version 05.2).

Alternative 1 is the only remaining realistic and credible alternative and is therefore identified as the most plausible baseline scenario.

Baseline emissions of alternative 1 are elaborated in Sections D and E, as well as Annex 2 below.

The key data used to establish the baseline in tabular form is presented below.

Data/Parameter	$CLNK_{cap}^{BL}$
Data unit	Tonnes
Description	Technical clinker capacity of the existing wet kilns
Time of determination/monitoring	Ex ante
Source of data (to be) use	Plant records
Value of data applied (for ex ante calculations/determinations)	2,270,000
Justification of the choice of data or description of measurement methods and procedures (to be) applied	It is defined according to the project technical documentation of Sukholozhskcement.
OA/QC procedures (to be) applied	-
Any comment	This parameter defines maximum possible clinker production at the existing kilns in baseline and is used in formulae 13 in Section D.

Data/Parameter	$CLNK_{y}^{BL}$
Data unit	Tonnes
Description	Clinker production in the baseline scenario on the existing wet kilns in year *y*
Time of determination/monitoring	During the crediting period
Source of data (to be) use	Plant records
Value of data applied (for ex ante calculations/determinations)	2,003,249
Justification of the choice of data or description of	This parameter is chosen as a minimum of $CLNK_{y}^{PR}$ or $CLNK_{cap}^{BL}$ (please see formulae 13 in section D.1.1.4).

measurement methods and procedures (to be) applied	The weighting method and volume-to-mass conversion method are used to identify the amount of clinker. The weighting equipment is being calibrated and checked by the plant staff.
OA/QC procedures (to be) applied	The company has special Department for Control and Measuring devices. This department is in charge of supervision of measuring devices operation and performance. It checks and substitutes devices (adjusted and calibrated) from the reserve if necessary. The company has approval regulations of measurements, registration and archiving data and the annual calibration and replacement devices schedule.
Any comment	This parameter is being used in calculations of emissions for replacement only.

Data/Parameter	BP_y^{incr}
Data unit	Tonnes
Description	Incremental cement production in the baseline scenario in year *y*
Time of determination/monitoring	During the crediting period
Source of data (to be) use	Plant records
Value of data applied (for ex ante calculations/determinations)	0
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This parameter is the difference between the project cement production and BP_y^{BL}. In case if $PP_y^{PR} = BP_y^{BL}$ then $BP_y^{incr} = 0$ The weighting method and volume-to-mass conversion method are used to identify the amount of cement. The weighting equipment is being calibrated and checked by the plant staff.
OA/QC procedures (to be) applied	The company has special Department for Control and Measuring devices. This department is in charge of supervision of measuring devices operation and performance. It checks and substitutes devices (adjusted and calibrated) from the reserve if necessary. The company has approval regulations of measurements, registration and archiving data and the annual calibration and replacement devices schedule.
Any comment	This parameter is being used emission calculations for incremental production. It may be zero.

Data/Parameter	EF_y^{wet}
Data unit	tCO_2/t clinker
Description	Emission factor of wet cement production in year *y*
Time of determination/monitoring	During the crediting period
Source of data (to be) use	Plant records
Value of data applied (for ex ante calculations/determinations)	0.823
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This parameter is calculated as emission factor wet cement lines (please see formulae 19 in section D.1.1.4).
OA/QC procedures (to be)	The company has special Department for Control and Measuring

applied	devices. This department is in charge of supervision of measuring devices operation and performance. It checks and substitutes devices (adjusted and calibrated) from the reserve if necessary. The company has approval regulations of measurements, registration and archiving data and the annual calibration and replacement devices schedule.
Any comment	This parameter will be recalculated annually to account for the situation when new cement mills are using clinker produced by existing wet lines.

Data/Parameter	$EF_{el,y}$
Data unit	tCO_2/MWh
Description	Standardized CO_2 emission factor
Time of determination/monitoring	Ex-ante
Source of data (to be) use	The study commissioned by “Carbon Trade and Finance”
Value of data applied (for ex ante calculations/determinations)	0.602
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The study commissioned by “Carbon Trade and Finance” is verified by Bereau Veritas
OA/QC procedures (to be) applied	-
Any comment	This the standardized CO_2 emission factor is operated margin emission factor for RES “Urals”

Data/Parameter	$BEF_{incr,y}$
Data unit	tCO_2/t cement
Description	Baseline emission factor for incremental cement production
Time of determination/monitoring	During the crediting period
Source of data (to be) use	OJSC “NIICEMENT” annual overview report “Russian cement industry in 2006”. This report contains the data of annual cement and clinker production and annual fuel and electricity consumption at Russian cement plants.
Value of data applied (for ex ante calculations/determinations)	0.774
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The approach of “Tool to calculate the emission factor for an electricity system” is used. IPCC default values are used for CO_2 emission factor of fossil fuels. The default grid emission factors for the regional power systems of Russia are used. Please see Annex 2 for more detail information.
OA/QC procedures (to be) applied	-
Any comment	-

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 Annex 1 of JI "Guidance on criteria for baseline setting and monitoring" in case of no approved CDM methodology is used, the following options can be applied to demonstrate that the reduction in emissions are additional to any that would otherwise occur

a) Application of the most recent version of the "Tool for the demonstration and assessment of additionality" (Version 05.2) approved by the CDM Executive Board;

b) Application of any other method for proving additionality approved by the CDM Executive Board;

c) Provision of traceable and transparent information showing that the baseline was identified on the basis of conservative assumptions, that the project scenario is not part of the identified baseline scenario and that the project will lead to reductions of anthropogenic emissions by sources or enhancements of net anthropogenic removals by sinks of GHGs;

d) Provision of traceable and transparent information that an accredited independent entity has already positively determined that a comparable project (to be) implemented under comparable circumstances (same GHG mitigation measure, same country, similar technology, similar scale) would result in a reduction of anthropogenic emissions by sources or an enhancement of net anthropogenic removals by sinks that is additional to any that would otherwise occur and a justification why this determination is relevant for the project at hand.

In this PDD the most recent "Tool for the demonstration and assessment of additionality" (version 05.2) (hereinafter referred to as Additionality Tool) is applied to prove that the anthropogenic emissions to demonstrate that the reduction in emissions are additional to any that would otherwise occur.

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

Sub-step 1a: Define alternatives to the project

The following alternatives to the proposed project were indentified:

Alternative 1: Operating the existing cement (wet) lines. The nearest cement plants will produce the remaining cement demand;
Alternative 2: Operating the existing cement (wet) lines and constructing a new line applying a wet process of cement production;
Alternative 3: Operating the existing cement (wet) lines and constructing a new line applying a semi-dry process of cement production;
Alternative 4: Operating the existing cement (wet) lines and constructing a new line applying a dry process of cement production;
Alternative 5: Decommissioning existing (wet) lines and building of new lines applying dry process;
Alternative 6: Decommissioning existing (wet) lines and building of new lines applying semi-dry process.

Description of alternatives is the same as provided in Section B.1. Only alternatives 1 and 4 were identified as, in principle, realistic and credible.

Sub-step 1b: Consistency with mandatory laws and regulations

All the alternatives defined during Sub-step 1a are compliant with the national laws and regulations.

Step 2: Investment analysis

The main goal of the investment analysis is to determine whether the proposed project is not:
(a) The most economically or financially attractive; or
(b) Economically or financially feasible, without the revenue from the sale of ERUs associated with the JI project.

To conduct the investment analysis, the following sub-steps have to be applied.

Sub-step 2a: Determine appropriate analysis method
In principle, there are three methods applicable for an investment analysis: simple cost analysis, investment comparison analysis and benchmark analysis.

A simple cost analysis (Option I) shall be applied if the proposed JI project and the alternatives identified in step 1 generate no financial or economic benefits other than JI related income. The proposed JI project results in additional sales revenues due to the new cement production capacity installed. Thus, this analysis method is not applicable.

An investment comparison analysis (Option II) compares suitable financial indicators for realistic and credible investment alternatives. As only alternative 4 represents an investment, a benchmark analysis (Option III) is applied.

Sub-step 2b: Option III. Apply benchmark analysis
The proposed project, dry cement line installation, shall be implemented by the project participant Sukholozhskcement. As soon it has no internal IRR benchmark for investment decisions making the approach recommended in p. 6 (a) of Additionality Tool is applied – using "government bonds rates increased by a suitable risk premium". As Russia does not have long term governmental bonds a conservative approach of using Central Bank RF discount rate of 12 % is proposed in the analysis. The risk rate is not applied. It is conservative. Thus overall IRR benchmark amounts to 12 %. If the proposed project (not being implemented as JI project) has a less favourable indicator, i.e. a lower IRR, than the benchmark, then the project cannot be considered as financially attractive.

Sub-step 2c: Calculation and comparison of financial indicators
The financial analysis refers to the time of investment decision-making.

The following assumptions have been used based on the information provided by the enterprise:

1. Investment decision: 01 March 2006, commissioning date: 01 April 2010;
2. The project investment cost accounts for of approximately EUR 259 million during five years;
3. The calculations are made at constant prices as of April 2006[8];
4. The exchange rate (EUR/RUR) is rounded up to 1/33.33 in accordance with the enterprise's conversion practice;
5. The project lifetime is around 16 years (lifetime of the main equipment);
6. The project does not foresee any replacement, so cash flows only for new capacities are considered;
7. Fuel consumption and electricity generation is taken into account in line with the technical specifications of the project design;
8. Natural gas is the biggest cost component constituting 28 % of total operation cost.
9. Electricity cost accounts for 23 % of the total operation cost;

[8] The calculation at constant prices as of the time of decision-making provides an objective view of the long-term future. It allows to perform a "pure" sensitivity analysis not impacted by expert estimations of inflation levels, prices etc., and to identify the most important factors really impacting the project's financial performance.

10. The scrap value is calculated as overall equipment weight (documented) multiplied by scrap price;
11. Production is assumed at the maximum technical capacity of 1,3 million tonnes of cement per year.

The project cash flow focuses, in addition to investment-related outflows, on revenue flows generated by additional sales of cement produced by the new dry kiln.
The project's financial indicators are presented in the Table B.2.1 below.

Table B.2.1. Financial indicators of the project

Scenario	**IRR (%)**	**Discounted PBP**	**Simple payback period (years)**[9]
Base case	10.1	Out of project lifetime	11

The cash flow analysis shows an IRR of 1.9 %, which is well below the IRR benchmark identified of 12%. A negative NPV[10] results. Hence, the project cannot be considered as financially attractive.

Sub-step 2d: Sensitivity analysis

A sensitivity analysis should be made to show whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions, as it can be seen by application of the Methodological Tool "Tool for the demonstration and assessment of additionality" (Version 05.2).

The following four key indicators were considered in the sensitivity analysis: investment cost, cement prices, electricity and gas tariffs. The other cost components account for less than 20 % of total or operation cost and therefore are not considered in the sensitivity analysis. In line with the Additionality Tool the sensitivity analysis should be undertaken within the corridor of ±10 % for the key indicators.

As it is unlikely that electricity tariffs or fuel prices will decrease in Russia, cement price decrease will reduce revenues, so the downward trends are not considered except the investment cost to try the robustness of cash flows.

Scenario 1 considers a 10% investment cost growth . Scenario 1 shows that this assumption worsened the cash flow performance due to significant cost increase.

Scenario 2 is based on the assumption of a 10% investment cost decrease that improves cash flow and performance indicators making IRR the closer to the conservative benchmark but usually in practice investment cost increases especially taking into account that project is implemented during five years. So this is unlikely that the cost will decrease making project IRR higher than conservative benchmark

Scenario 3 implies cement price raise 10%. The effect is similar to that described in S*cenario 2* and performance is better. It goes without saying that cement prices is the most revenue driving indicator. But IRR benchmark considered in the analysis is very conservative not taking into account the risk factor applied to this type of project so the cash flows remain robust.

Scenario 4 implies electricity tariff increase 10%. As electricity cost is one of the main cost components tariff increase worsens the cash flow performance indicators.

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[9] The discounted payback period would be outside of the project lifetime.

[10] Net present value

Scenario 5 assumes 10% natural gas tariff growth. The result is similar to *Scenario 4.*

In all scenarios NPV is negative. Simple payback period is more 10-12 years and discounted payback period exceeds project life time.

A summary of the results is presented in the Table B.2.2 below.

Table B.2.2: Sensitivity analysis (summary)

Scenario	IRR (%)	Discounted PBP (years)	Simple payback period (years)[11]
Scenario 1	8.7	Out of project lifetime	11
Scenario 2	11.6	Out of project lifetime	10
Scenario 3	11.9	Out of project lifetime	10
Scenario 4	9.9	Out of project lifetime	11
Scenario 5	9.9	Out of project lifetime	11

Hence, the sensitivity analysis consistently supports (for a realistic range of assumptions) the conclusion that the project is unlikely to be financially/economically attractive.

Step 3: Barrier analysis

In line with the Additionality Tool, a barrier analysis is not conducted.

Step 3: Barrier analysis

In line with the Additionality Tool no barrier analysis is needed when investment analysis is applied.

Step 4: Common practice analysis
In line with the Tool this analysis serves as credibility check to complement the investment analysis (Step 2) or barrier analysis (Step 3) if the latter is applicable. The existing common practice is identified and discussed through the following Sub-steps:

Sub-step 4a: Analyze other activities similar to the proposed project activity:
In Russia the majority of kilns at cement plants were constructed before 1988. About 86 % of cement is produced using the wet method. The wet process was the predominant technology in the Soviet Union.
The average distance of cement transportation in Urals is 554 km [12]. This means that changes in cement production at one plant will not induce any influence at cement production by another plant located at 1108 km distance.

Out of cement plants built after the break-up of the Soviet Union only OJSC Soda and OJSC Magnitogorskiy cementno-ogneuporniy plant are located within this circle. These new cement plants in the radius are presented in Table B.2.1.

[11] The discounted payback periods would be outside of the project lifetime.

[12] This and further information on cement plants is taken from annual reports of OJSC NII Cement (Cement Research Studies Institute), "Russian cement industry in 2006", 2007. Annual report of this institutewill be used also for monitoring purposes.

Table B.2.1: New cement capacities in Ural region

Cement plant	Location	Capacity, t (cement)	Fuel	Production method
OJSC Soda	Sterlotamak, Bashkortostan republic	1,000,000	Gas	Dry
OJSC Magnitogorsk cement plant	Magnitogorsk, Chelyabinsk area	500,000	Gas	Wet

Source: JSC "NIICEMENT" (Cement Research Studies Institute) and mass media.

Only two out of old cement plants (built before the break-up of the Soviet-Union) use dry process of cement production (OJSC Nevyansky cementnik, OJSC Katavasky cement) within a radius of 1,108 km (12 cement plants defined in Annex 2). However, for the purpose of the credibility check of the Additionality Tool (page 10), these old plant are ignored as they are not relevant in verifying the outcome of the investment analysis.
Therefore the proposed JI project does not reflect a widely observed and commonly carried out activity.

Sub-step 4b: Discuss any similar Options that are occurring:
It is required to follow Sub-step 4b according to of the Tool when this project is widely observed and commonly carried out. The proposed JI project does not represent a widely observed practice in the area considered (see Sub-step 4a). So, this sub-step is not applied.

Sub-steps 4a and 4b are satisfied, i.e. similar activities cannot be widely observed. Thus proposed project activity is not a common practice.

Conclusion: Thus the additionality analysis demonstrates that project emission reductions are additional to any that would otherwise occur.

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

Sources of GHG emissions are defined in accordance with approved CDM methodologies (ACM0003, ACM0005, ACM0015, AM0033, AM0040, AM0024) and JI project "Switch from wet-to-dry process at Podilsky Cement, Ukraine". There are three different sources of GHG emissions while producing cement:

1. Geogonic emissions from the calcination (decarbonisation) process in the kiln;
2. Fuel combustion;
3. GHG emissions in the power grid as a result of electricity consumption.

An overview of all emission sources in the cement production process of the proposed project is given in Table B.3.1 below. The subproject boundary shall encompass all anthropogenic emissions by sources of GHGs which are:

- Under the control of the project participants;
- Reasonably attributable to the project; and
- Significant, i.e., as a rule of thumb, would by each source account on average per year over the crediting period for more than 1 per cent of the annual average anthropogenic emissions by sources of GHGs, or exceed an amount of 2,000 tonnes of CO_2 equivalent, whichever is lower.

Table B.3.1: Sources of emissions

№	Source	Gas[13]	Included/ excluded	Justification/Explanation
1	Fuel consumption at the quarry	CO_2	Excluded	• Minor source of emissions (less than 1%); • It can be reasonably assumed that emissions in the project and baseline scenarios are comparable.
2	Grid electricity consumption at the quarry	CO_2	Excluded	• The same as above.
3	Grid electricity consumption during the process of raw material transportation	CO_2	Excluded	• Minor source of emissions (less than 1%) as raw material is transported at the site by dump trucks; • It can be reasonably assumed that emissions in the project and baseline scenarios are comparable; • Fuel consumption is included for reasons of conservativeness (see below).
4	Fuel consumption during the process of raw material transportation	CO_2	Excluded	• In the project and baseline scenarios the fuel consumption will be the same.
5	Fuel combustion to dry the raw materials	CO_2	Included	• In the project and baseline scenarios the fuel combustion will differ; • Emissions are calculated using an IPCC emission factor.

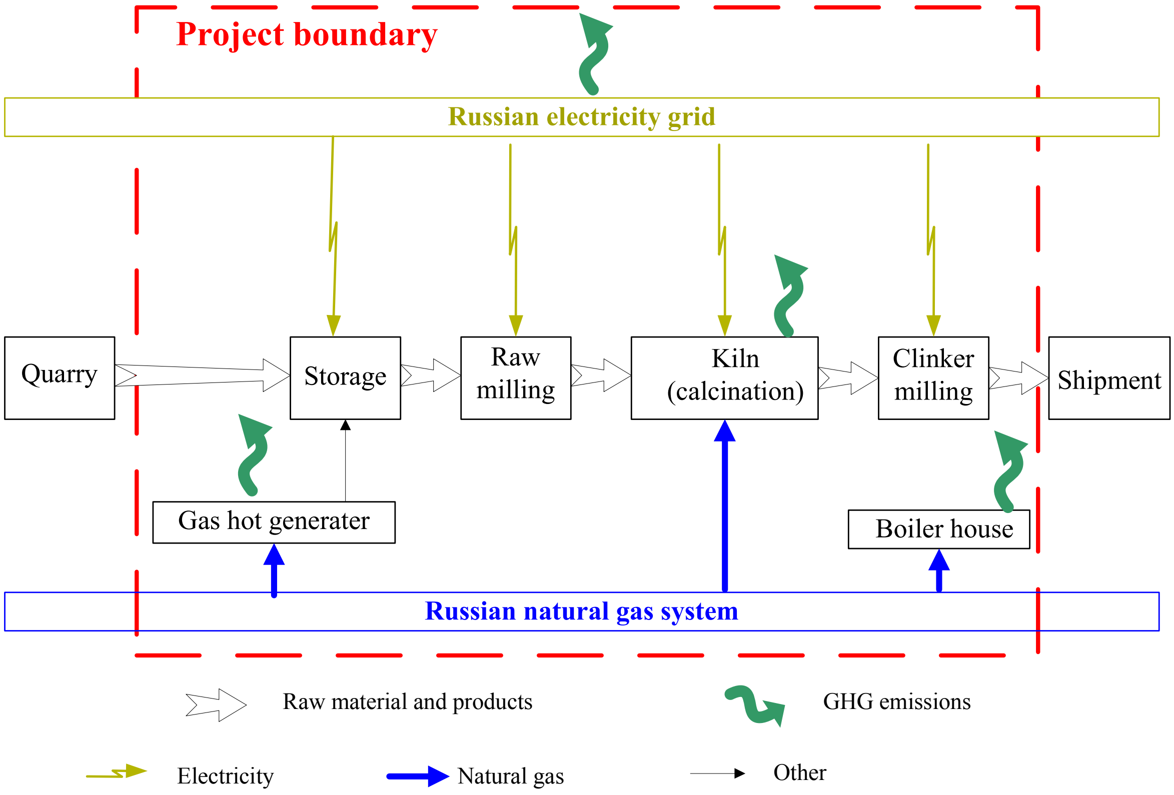
[13] Only CO_2 emissions are taken into account. CH_4 and N_2O emissions are neglected. This is conservative and in line with relevant CDM approaches . Please refer also to the general remarks in Section D.1.

№	Source	Gas[13]	Included/ excluded	Justification/Explanation
6	Fuel combustion to defrost carriages	CO_2	Included	• In the project and baseline scenarios the fuel combustion will differ; • Emissions are calculated using an IPCC emission factor.
7	Fuel combustion to heat generation in boiler-house	CO_2	Included	• In the project and baseline scenarios the fuel combustion will differ; • Emissions are calculated using an IPCC emission factor.
8	Grid electricity consumption for cement production	CO_2	Included	• In the project and baseline scenarios the grid electricity consumption will differ; • Emissions are calculated using a standardized Russian regional electricity emission factor (see Annex 2).
9	Fossil fuel (natural gas) combustion in the kiln	CO_2	Included	• In the project and baseline scenarios the fuel combustion will differ; • Emissions are calculated using an IPCC emission factor.
10	Calcination of raw materials	CO_2	Included	• Emissions are calculated using a calcination emission factor[14].

[14] WBCSD, CO_2 Accounting and Reporting Standard for the Cement Industry (2005)

The emission sources within the project boundary are also shown in Figure B.3.1 below.

Figure B.3.1: Sources of emissions and project boundary



Please see Sections D. and E. for detailed data on the emissions within the project boundary.

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 completion of the baseline study: 26 October 2009

Name of person/entity setting the baseline:
Mikhail Butyaykin
Global Carbon BV
Phone: +31 30 850 6724
Fax: +31 70 891 0791
E-mail: butyaykin@global-carbon.com

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Board of Directors of Sukholozhskcement with Dyckerhoff AG decided to conduct a feasibility study on the new dry cement production line at Sukholozhskcement on the 28th February 2006.

C.2. Expected operational lifetime of the project:

The operational lifetime of the project is 15.42 years or 185 months. This corresponds to expected operational lifetime of the dry kiln – the biggest investment cost item.

C.3. Length of the crediting period:

Start of crediting period: 01/08/2010
Length of crediting period: 2.42 years or 29 months

Emission reductions generated after the crediting period may be used in accordance with an appropriate mechanism under the UNFCCC.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

In this project JI specific approach regarding monitoring is used. As elaborated in Section B.3, the project activity only affects the emissions related to the fuel consumption during the raw material transportation, drying, calcination, heat production, defrost carriages and electricity consumption and GHG emission during calcination process while the cement production. To establish the baseline emissions and to monitor the project emissions, only these emissions will be monitored. Emissions related to the electricity consumption during the raw material extraction, transportation and the fuel consumption (at the quarry) are excluded.

The following assumptions for calculation of both baseline and project emissions were used:
- The cement demand in the market is the same in the project and baseline scenario;
- The clinker factor is the same in the project and baseline scenario;
- The type of fuel combusted in the kiln(s) is not influenced by the project;
- The emissions from electricity consumption are established using the relevant regional Russian standardized grid emission factor, as described in Annex 2.

The project emissions are established in the following way:
- The project emission is the sum of emissions of existing and new cement capacity;
- Greenhouse emissions are determined using technical data of new and existing equipment for cement production.

The baseline emissions are established in the following way:
- The existing equipment lifetime extends to 2020;
- Energy efficiency measures will not be implemented at the existing wet kilns until the end of the crediting period;
- Under the baseline scenario all existing equipment will be in operation and will produce at technical capacity;
- The baseline emissions of the incremental production are established using the Combined Margin approach as given in Annex 2;
- The baseline emissions are monitored and calculated every year.

General remarks:

- Social indicators, such as number of people employed, safety records, training records etc., will be available to a verifier, if required;
- Environmental indicators, such as dust, NO_x, or SO_x emissions, will be available to the verifier, if required;
- Only CO_2 emissions as GHG are taken into account. Cement kilns normally have CH_4 emissions of 0.06 g/kg of clinker and N_2O emissions of 0.001 g/kg of clinker, compared with more than 650 g CO_2/kg of clinker. Omitting these two emissions for a cement kiln is conservative, because they contribute less than 0.01

% of the total emissions, far below the confidence level for the CO_2 data calculations. This is confirmed in the VDZ Environmental Report 2001 (English) and 2004 (German). CH_4 and N_2O emission reductions will not be claimed. This is conservative.

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
P1	PE_y	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-
P2	PE_y^{wet}	Plant records	tCO2	C	Annually	100%	Electronic and paper	-
P3	PE_y^{dry}	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-
P4	$PE_{calc,y}^{wet}$	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-
P5	$PE_{fuel,y}^{wet}$	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-
P6	$PE_{el,y}^{wet}$	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-
P7	$PE_{calc,y}^{dry}$	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-
P8	$PE_{fuel,y}^{dry}$	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-
P9	$PE_{el,y}^{dry}$	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-
P10	$CLNK_y^{wet}$	Plant records	tonnes	M/C	Monthly	100%	Electronic and paper	-
P11	$CLNK_y^{dry}$	Plant records	tonnes	M/C	Monthly	100%	Electronic and paper	-
P12	$PE_{fuel\_a,y}^{wet}$	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-

P13	EF_{fuel_a}	IPCC	tCO2/GJ	C	Fixed ex ante	100 %	Electronic and paper	Default values (IPCC 2006)
P14	$NCV_{fuel\_a,y}$	Plant records	GJ/ m^3	M/C	Per shipment/ annually	100 %	Electronic and paper	Weighted average NCV will be taken over a calendar year for each fuel
P15	$PF_{fuel\_a,y}^{wet}$	Plant records	m^3	M	Continuously	100%	Electronic and paper	-
P16	$PE_{fuel\_a,y}^{dry}$	Plant records	tCO_2	C	Annually	100%	Electronic and paper	-
P17	$PF_{fuel\_a,y}^{dry}$	Plant records	m^3	M	Continuously	100%	Electronic and paper	-
P18	$EF_{el,y}$	See Annex 2	tCO_2/ MWh	C	Fixed ex ante	100 %	Electronic and paper	Electricity grid GHG emission factor for JI projects in Russian Regional Energy System “Ural”. See Annex 2.
P19	$PEL_{el,y}^{wet}$	Plant records	MWh	M/C	Continuously	100 %	Electronic and paper	-
P20	$PEL_{el,y}^{dry}$	Plant records	MWh	M/C	Continuously	100 %	Electronic and paper	-
P21	$EF_{dec,y}$	Cement Sustainability Initiative (CSI) of the World Business Council for Sustainable Development	-	E	Fixed ex ante	100%	Electronic and paper	-

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

$$PE_y = PE_y^{wet} + PE_y^{dry} \qquad (1)$$

Where:[15]

PE_y Project emissions in year *y* (tCO_2);

PE_y^{wet} Project emissions from wet process of cement production in year *y* (tCO_2);

PE_y^{dry} Project emissions from dry process of cement production in year *y* (tCO_2);

$$PE_y^{wet} = PE_{calc,y}^{wet} + PE_{fuel,y}^{wet} + PE_{el,y}^{wet} \qquad (2)$$

Where:

PE_y^{wet} Project emissions from wet process of cement production in year *y* (tCO_2);

$PE_{calc,y}^{wet}$ Project emissions (wet lines) due to calcination in year *y* (tCO_2);

$PE_{fuel,y}^{wet}$ Project emissions (wet lines) due to combustion of fuels in year *y* (tCO_2);

$PE_{el,y}^{wet}$ Project emissions (wet lines) due to electricity consumption for raw meal preparation (milling, handling), and grinding of clinker, as well as of the kilns and boilers (tCO_2).

$$PE_y^{dry} = PE_{calc,y}^{dry} + PE_{fuel,y}^{dry} + PE_{el,y}^{dry} \qquad (3)$$

Where:

PE_y^{dry} Project emissions from dry process of cement production in year *y* (tCO_2);

$PE_{calc,y}^{dry}$ Project emissions (dry line) due to calcination in year *y* (tCO_2);

[15] Each parameter of

$PE_{fuel,y}^{dry}$	Project emissions (dry line) due to combustion of fuels in year *y* (tCO_2);
$PE_{el,y}^{dry}$	Project emissions (dry line) due to electricity consumption for raw meal preparation (milling, handling), and grinding of clinker, as well as of the kilns and boilers (tCO_2).

Project emissions due to calcination

$$PE_{calc,y}^{wet} = EF_{dec,y} \times CLNK_{y}^{wet} \qquad (4)$$

Where:

$PE_{calc,y}^{wet}$	Project emissions (wet lines) due to calcination in year *y* (tCO_2);
$EF_{dec,y}$	Default emission factor (tCO_2/t clinker)[16];
$CLNK_{y}^{wet}$	Production of clinker (wet lines) in the project scenario in year y (tonnes).

$$PE_{calc,y}^{dry} = EF_{dec,y} \times CLNK_{y}^{dry} \qquad (5)$$

Where:

$PE_{calc,y}^{dry}$	Project emissions (dry line) due to calcination in year *y* (tCO_2);
$EF_{dec,y}$	Default emission factor (tCO_2/t clinker);
$CLNK_{y}^{dry}$	Production of clinker (dry line) in the project scenario year y (tonnes).

Project emissions due to fuel consumption by wet lines

There are several consumers of fuels: kilns, the drying section and the boiler house. The emissions due to the combustion of fuels are estimated/calculated as follows:

$$PE_{fuel,y}^{wet} = PE_{fuel\_a,y}^{wet} \qquad (6)$$

[16] Cement Sustainability Initiative (CSI) of the World Business Council for Sustainable Development (WBCSD) 2005, CO_2 Accounting and Reporting Standard for the Cement Industry, www.wbcsd.org

Where:

$PE^{wet}_{fuel,y}$	Project emissions (wet lines) due to combustion of fuels in year *y* (tCO_2);
$PE^{wet}_{fuel\_a,y}$	Project emissions (wet lines) from combustion of fuel of type *a* (natural gas) in the kilns, the drying section, the boiler house in year *y* (tCO_2).

Emissions of CO_2 due to combustion of fuels of type *a* (natural gas) in the existing cement production are calculated according to the following formula:

$$PE^{wet}_{fuel\_a,y} = \sum_a PF^{wet}_{fuel\_a,y} \times EF_{fuel\_a} \times NCV_{fuel\_a,y} \qquad (7)$$

Where:

$PE^{wet}_{fuel\_a,y}$	Project emissions (wet lines) from combustion of fuel of type *a* (natural gas) in the kilns, the drying section, the boiler house in year *y* (tCO_2);
$PF^{wet}_{fuel\_a,y}$	Total consumption of fuel of type *a* in the existing cement production in year *y* (tonnes or m^3);
$NCV_{fuel\_a,y}$	Net calorific value of fuel of type *a* in year *y* (GJ/(tonne or m^3);
EF_{fuel_a}	Emission factor of fuel of type *a* (tCO_2/GJ).

Project emissions due to fuel consumption by the dry line

There will be several consumers of fuels after project implementation: the new kiln, the drying section (hot gas generator during drying of raw material), the boiler house, and dump trucks (during raw material transportation). The emissions due to the combustion of fuels are estimated/calculated as follows:

$$PE^{dry}_{fuel,y} = PE^{dry}_{fuel\_a,y} \qquad (8)$$

Where:

$PE^{dry}_{fuel,y}$	Project emissions (dry line) due to combustion of fuels in year *y* (tCO_2);
$PE^{dry}_{fuel\_a,y}$	Project emissions (dry line) from combustion of fuel of type *a* (natural gas) in the kilns, the drying section, the boiler house in year *y* (tCO_2).

Emissions of CO_2 due to combustion of fuels of type *a* (natural gas) in the new cement production are calculated according to the following formula:

$$PE_{fuel\_a,y}^{dry} = \sum_{a} PF_{fuel\_a,y}^{dry} \times EF_{fuel\_a} \times NCV_{fuel\_a,y} \quad (9)$$

Where:

$PE_{fuel\_a,y}^{dry}$ Project emissions (dry line) from combustion of fuel of type *a* (natural gas) in the kilns, the drying section, the boiler house in year *y* (tCO_2);

$PF_{fuel\_a,y}^{dry}$ Total consumption of fuel of type *a* in the new cement production in year *y* (tonnes or m^3);

$NCV_{fuel\_a,y}$ Net calorific value of fuel of type *a* in year *y* (GJ/(tonne or m^3);

EF_{fuel_a} Emission factor of fuel of type *a* (tCO_2/GJ).

Project emissions due to electricity consumption by the wet lines

There is possibility of new cement (clinker) mills usage for clinker which will be produced by the existing wet lines. But total project (wet and dry lines) electricity consumption will not be changed. Thus the electricity consumption of the new cement mills for clinker which will be produced by wet lines will not be separated.

The emissions due to the electricity consumption of raw material preparation, of the kilns, of the boilers and of grinding clinker are estimated/calculated as follows:

$$PE_{el,y}^{wet} = EF_{el,y} \times PEL_{el,y}^{wet} \quad (10)$$

Where:

$PE_{el,y}^{wet}$ Project emissions (wet lines) due to electricity consumption for raw meal preparation (milling, handling), and grinding of clinker, as well as of the kilns and boilers (tCO_2);

$EF_{el,y}$ Standardized CO_2 emission factor of the relevant regional electricity grid in year *y* (tCO_2/MWh), fixed ex-ante (see annex 2);

$PEL_{el,y}^{wet}$ The electricity consumption during cement production by the wet lines in year *y* (MWh).

Project emissions due to electricity consumption by the dry line

There is a possibility of new cement mills to use clinker produced by the existing wet lines. But total project (wet and dry lines) electricity consumption will not be changed. Thus this indicator (electricity) is not considered separately.

Emissions that are due to electricity consumption of raw material preparation, of the new kiln, of boilers and of grinding clinker are estimated/calculated as follows:

$$PE_{el,y}^{dry} = EF_{el,y} \times PEL_{el,y}^{dry} \qquad (11)$$

Where:

$PE_{el,y}^{dry}$ Project emissions (dry line) due to electricity consumption for raw meal preparation (milling, handling), and grinding of clinker, as well as of the kilns and boilers (tCO_2);

$EF_{el,y}$ Standardized CO_2 emission factor of the relevant regional electricity grid in year *y* (tCO_2/MWh), fixed ex-ante (see Annex 2);

$PEL_{el,y}^{dry}$ Electricity consumption during cement production by the wet lines in year *y* (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
B1	BE_y	Plant records	tCO2	C	Annually	100%	Electronic and paper	-
B2	$BE_{onsite,y}$	Plant records	tCO2	C	Annually	100%	Electronic and paper	-
B3	$BE_{incr,y}$	Plant records	tCO2	C	Annually	100%	Electronic and paper	-
B4	$CLNK_y^{BL}$	Plant records	tonnes	C	Annually	100%	Electronic and paper	-
B5	$CLNK_y^{PR}$	Plant records	tonnes	C	Annually	100%	Electronic and paper	-
B6	$CLNK_{cap}^{BL}$	Plant records	tonnes	C	Fixed ex-ante	100%	Electronic and paper	Technical clinker capacity of the existing on-site wet kilns
B7	BP_y^{BL}	Plant records	tonnes	C	Annually	100%	Electronic and paper	-
B8	PP_y^{PR}	Plant records	tonnes	C	Monthly	100%	Electronic and paper	-
B9	PP_y^{wet}	Plant records	tonnes	M/C	Monthly	100%	Electronic and paper	-
B10	PP_y^{dry}	Plant records	tonnes	M/C	Monthly	100%	Electronic and paper	-
B11	BP_y^{incr}	Plant records	tonnes	C	Annually	100%	Electronic and paper	-
B12	EF_y^{wet}	Plant records	tCO_2/t cement	C	Annually	100%	Electronic and paper	-

B13	$CLNK_y^{mill}$	Plant records	tonnes	M/C	Continuously	100%	Electronic and paper	**-**
B14	$EF_y^{wet\_mill}$	Plant records	tCO_2/t clinker	C	Annually	100%	Electronic and paper	**-**
B15	$PEL_{el,y}^{mill\_wet\_lines}$	Plant records	MWh	M/C	Continuously	100%	Electronic and paper	-
B16	$CLNK_y^{mill\_wet\_lines}$	Plant records	tonnes	C	Continuously	100%	Electronic and paper	**-**
B17	$BEF_{incr,y}$	Plant records	tCO_2/t cement	C	Annually	100%	Electronic and paper	See Annex 2
B18	OM_y	OJSC “NIICEMENT”	tCO_2/t cement	C	Annually	100 %	Electronic and paper	See Annex 2
B19	BM_y	OJSC “NIICEMENT”	tCO_2/t cement	C	Annually	100 %	Electronic and paper	See Annex 2
B20	$EL_{OM,y}$	OJSC “NIICEMENT”	MWh	M/C	Annually	100 %	Electronic and paper	See Annex 2
B21	$CLNK_{OM,y}$	OJSC “NIICEMENT”	tonnes	M/C	Annually	100 %	Electronic and paper	See Annex 2
B22	$NCV_{fuel\_i,incr}$	OJSC “NIICEMENT”	GJ/(tonne or m^3)	M/C	Annually	100 %	Electronic and paper	See Annex 2
B23	$FUEL_{OM,i,y}$	OJSC “NIICEMENT”	tonnes or 1000 m^3	M/C	Annually	100 %	Electronic and paper	See Annex 2
B24	$CEM_{OM,y}$	OJSC “NIICEMENT”	tonnes	M/C	Annually	100 %	Electronic and paper	See Annex 2
B25	$EL_{BM,y}$	OJSC “NIICEMENT”	MWh	M/C	Annually	100 %	Electronic and paper	See Annex 2
B26	$CLNK_{BM,y}$	OJSC “NIICEMENT”	tonnes	M/C	Annually	100 %	Electronic and paper	See Annex 2
B27	$FUEL_{BM,i,y}$	OJSC “NIICEMENT”	tonnes or 1000 m^3	M/C	Annually	100 %	Electronic and paper	See Annex 2
B28	$CEM_{BM,y}$	OJSC “NIICEMENT”	tonnes	M/C	Annually	100 %	Electronic and paper	See Annex 2

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

As further described in Annex 2, the baseline emissions have two sources:

- Production at the existing wet kilns (replacement production);
- Production by other cement plants (incremental production).

The first part in formula 17 reflect the baseline emissions connected with the existing on-site wet kilns, the second part refers to the baseline emissions of the incremental production.

$$BE_y = BE_{onsite,y} + BE_{incr,y} \quad (12)$$

Where:

BE_y Baseline emissions in year *y* (tCO_2);

$BE_{onsite,y}$ Baseline emissions due to on-site production in year *y* (tCO_2);

$BE_{incr,y}$ Baseline emissions due to incremental production in year *y* (tCO_2) (see also annex 2).

Cement production (on-site)

In the baseline scenario, the existing wet kilns will continue production up to the technical capacity. Cement production on the existing wet kilns in the baseline scenario will be as follows:

$$CLNK_y^{BL} = MIN[CLNK_y^{PR}, CLNK_{cap}^{BL}] \qquad (13)$$

Where:

$CLNK_y^{BL}$ Clinker production in the baseline scenario on the existing wet kilns in year *y* (tonnes);

$CLNK_y^{PR}$ Total clinker production in the project scenario in year *y* (tonnes);

$CLNK_{cap}^{BL}$ Technical clinker capacity of the existing wet kilns (tonnes).

Total clinker production in the project scenario in year *y* is calculated as follows:

$$CLNK_y^{PR} = CLNK_y^{dry} + CLNK_y^{wet} \qquad (14)$$

Where:

$CLNK_y^{PR}$ Total clinker production in the project scenario in year *y* (tonnes);

$CLNK_y^{dry}$ Production of clinker (dry line) in the project scenario in year y (tonnes);

$CLNK_y^{wet}$ Production of clinker (wet lines) in the project scenario in year y (tonnes).

Cement production in the baseline scenario on the existing kilns in year *y* is calculated as follows:

$$BP_y^{BL} = \frac{PP_y^{PR}}{CLNK_y^{PR}} \times CLNK_y^{BL} \qquad (15)$$

Where:

BP_y^{BL} Cement production in the baseline scenario on the existing kilns in year *y* (tonnes);

$CLNK_y^{PR}$ Clinker production in the project scenario in year *y* (tonnes);

PP_y^{PR} Total cement production of cement in the project scenario in year y (tonnes);
$CLNK_y^{BL}$ Clinker production in the baseline scenario on the existing kilns in year *y* (tonnes).

Total cement production of cement in year y is calculated as follows:

$$PP_y^{PR} = PP_y^{wet} + PP_y^{dry} \quad (16)$$

Where:
PP_y^{PR} Total cement production of cement in year y (tonnes);
PP_y^{wet} Production of cement (wet lines) in the project scenario in year y (tonnes);
PP_y^{dry} Production of cement (dry line) in the project scenario in year y (tonnes).

Incremental cement production

Cement production in the incremental part of the baseline scenario is calculated as follows:

$$BP_y^{incr} = PP_y^{PR} - BP_y^{BL} \text{ ; in case if } PP_y^{PR} = BP_y^{BL} \text{ then } BP_y^{incr} = 0 \quad (17)$$

Where:
BP_y^{incr} Incremental cement production in the baseline scenario in year *y* (tonnes);
PP_y^{PR} Total cement production of cement in the project scenario in year y (tonnes);
BP_y^{BL} Cement production in the baseline scenario on the existing kilns in year *y* (tonnes).

Baseline emissions due to on-site cement production

The on-site baseline emission due to cement production is calculated as follows:

$$BE_{onsite,y} = BP_y^{BL} \times EF_y^{wet}$$

(18)

Where:

$BE_{onsite,y}$ Baseline emissions due to on-site production in year *y* (tCO_2);

BP_y^{BL} Cement production in the baseline scenario on the existing kilns in year *y* (tonnes);

EF_y^{wet} Emission factor of wet cement production in year *y* (tCO_2 /tonnes of cement).

There is a possibility of new cement mills to use clinker produced by existing wet lines. Thus electricity consumption of the new cement mills will include electricity for clinker which will be produced by wet lines. Therefore emission factor of wet cement production is calculated as follows:

$$EF_y^{wet} = \frac{PE_y^{wet} + CLNK_y^{mill} \times EF_y^{wet\_mill}}{PP_y^{wet}} \quad (19)$$

Where:

EF_y^{wet} Emission factor of wet cement production in year *y* (tCO_2 /tonnes of cement);

PE_y^{wet} Project emissions from wet process of cement production in year *y* (tCO_2);

$CLNK_y^{mill}$ Clinker volume which will be directed to the new cement mills from wet lines in year *y* (tonnes of clinker);

$EF_y^{wet\_mill}$ Emission factor of cement mills in wet lines cement production in year *y* (tCO_2 /tonnes of clinker);

PP_y^{wet} Production of cement (wet lines) in the project scenario in year y (tonnes).

Emission factor of cement mills in wet lines cement production is calculated as follows:

$$EF_y^{wet\_mill} = \frac{PEL_{el,y}^{mill\_wet\_lines} \times EF_{el,y}}{CLNK_y^{mill\_wet\_lines}} \quad (20)$$

Where:

$EF_y^{wet\_mill}$ Emission factor of cement mills in wet lines cement production in year *y* (tCO_2 /tonnes of clinker);

$PEL_{el,y}^{mill\_wet\_lines}$ Electricity consumption of cement mills in the wet lines cement production in year *y* (MWh);

$EF_{el,y}$ Standardized CO_2 emission factor of the relevant regional electricity grid in year *y* (tCO_2/MWh), fixed ex-ante (see Annex 2);

$CLNK_y^{mill\_wet\_lines}$ Clinker volume which will be milled in wet lines cement production in year *y* (tonnes of clinker).

Clinker volume which will be milled in wet lines cement production is calculated as follows:

$$CLNK_y^{mill\_wet\_lines} = CLNK_y^{wet} - CLNK_y^{mill} \quad (21)$$

Where:

$CLNK_y^{mill\_wet\_lines}$ Clinker volume which will be milled in wet lines cement production in year *y* (tonnes of clinker).

$CLNK_y^{wet}$ Production of clinker (wet lines) in the project scenario in year y (tonnes);

$CLNK_y^{mill}$ Clinker volume which will be directed to the new cement mills from wet lines in year *y* (tonnes of clinker).

Baseline emissions due to incremental production

$$BE_{incr,y} = BP_y^{incr} \times BEF_{incr,y} \quad (22)$$

Where:

$BE_{incr,y}$ Baseline emissions due to incremental production in year *y* (tCO_2) (see also annex 2).

BP_y^{incr} Incremental cement production in the baseline scenario in year *y* (tonnes);

$BEF_{incr,y}$ Baseline emission factor for incremental cement production in year *y* (tCO_2/t cement) (see Annex 2).

In accordance with the methodological approach elaborated in Annex 2, depending on whether recent cement capacity additions can be identified within a radius of about 1,108 km[17] (interfere influencing), the baseline emission factor for incremental cement production is estimated/calculated in the following way:

$$BEF_{incr,y} = OM_y \quad \text{or} \quad BEF_{incr,y} = \frac{OM_y + BM_y}{2} \quad (23)$$

Where:

[17] OJSC “NII Cement” (Cement Research Studies Institute)

OM_y Operating margin (OM) emission factor of cement production at the cement plants in the OM in year y (tCO_2/t cement) (see Annex 2);
BM_y Build margin (BM) emission factor of cement production at the cement plants in the BM in year y (tCO_2/t cement) (see Annex 2).

The OM emission factor is estimated/calculated in the following way:

$$OM_y = \frac{EF_{el,y} \times EL_{OM,y} + EF_{dec,y} \times CLNK_{OM,y} + \sum_i EF_{fuel\_i} \times NCV_{fuel\_i,incr} \times FUEL_{OM,i,y}}{CEM_{OM,y}} \qquad (24)$$

Where:
OM_y Operating margin (OM) emission factor of cement production at the cement plants in the OM in year y (tCO_2/t cement) (see Annex 2);
$EF_{el,y}$ Standardized CO_2 emission factor of the relevant regional electricity grid in year y (tCO_2/MWh), fixed ex-ante (see Annex 2);
$EL_{OM,y}$ Total electricity consumption at the cement plant in the OM in year y (MWh);
$EF_{dec,y}$ Default emission factor (tCO_2/t clinker);
$CLNK_{OM,y}$ Total clinker production at the cement plants in the OM in year y (tonnes);
EF_{fuel_i} Carbon emission factor of kiln fuel i (tCO_2/GJ);
$NCV_{fuel\_i,incr}$ Net calorific value of kiln fuel i (GJ/tonne or 1000 m^3);
$FUEL_{OM,i,y}$ Total fuel consumption of kiln fuel i at the cement plants in the OM in year y (tonnes or 1000 m^3);
$CEM_{OM,y}$ Total cement production at the cement plants in the OM in year y (tonnes).

The BM emission factor is estimated/calculated in the following way:

$$BM_y = \frac{EF_{el,y} \times EL_{BM,y} + EF_{dec,y} \times CLNK_{BM,y} + \sum_i EF_{fuel\_i} \times NCV_{fuel\_i,incr} \times FUEL_{BM,i,y}}{CEM_{BM,y}} \qquad (25)$$

Where:
BM_y Build margin (BM) emission factor of cement production at the cement plants in the BM in year y (tCO_2/t cement) (see Annex 2).

$EF_{el,y}$ Standardized CO_2 emission factor of the relevant regional electricity grid in year *y* (tCO_2/MWh), fixed ex-ante (see Annex 2);

$EL_{BM,y}$ Total electricity consumption at the cement plants in the BM in year *y* (MWh);

$EF_{dec,y}$ Default emission factor (tCO_2/t clinker);

$CLNK_{BM,y}$ Total clinker production at the cement plant in the BM in year *y* (tonnes);

EF_{fuel_i} Carbon emission factor of kiln fuel *i* (tCO_2/GJ);

$NCV_{fuel\_i,incr}$ Net calorific value of kiln fuel *i* (GJ/tonne or 1000 m^3);

$FUEL_{BM,i,y}$ Total fuel consumption of kiln fuel *i* at the cement plant in the BM in year *y* (tonnes or 1000 m^3);

$CEM_{BM,y}$ Total cement production at the new cement plant in the BM in year *y* (tonnes).

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

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

Not applicable

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):

Not applicable

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

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):

$$ER_y = BE_y - PE_y \qquad (25)$$

Where:

ER_y Emission reductions due to the proposed JI project in year y (tCO_2);

BE_y Baseline emissions in year y (tCO_2);

PE_y Project emissions in year *y* (tCO_2).

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:

The main relevant Russian Federation environmental regulations:
- Federal law of Russian Federation "On Environment Protection" (10 January 2002, N 7-FZ);
- Federal law of Russian Federation "On Air Protection" (04 May 1999, N 96-FZ).

According to national requirements, emissions connected with the plant operation have to be measured once a year or three years. It is described in the Volume of Maximum Allowable Emissions approved by Rostekhnadzor RF (Russian Federal Service for Ecological, Technical and Atomic Supervision) and Rospotrebnadzor (Federal Service on Surveillance for Consumer rights protection and human well-being). Sukholozhskcement systematically collects pollution data that may have negative impact on the local environment. This monitoring being made and data being collected and being archived by accredited laboratory of Sukholozhskcement. Data collected and archived to be stored more five years in paper and electronically. Data reporting period of monitored pollutants are presented in Table D.1.5.1.

Table D.1.5.1: Data reporting period of monitored pollutants

Monitored pollutants	Occurrence
Iron oxide	once in three years
Manganese compounds	once in three years
Dust	annually
Nitrogen dioxide	annually
Nitrogen oxide	annually
Sulfur dioxide	annually
Emulsin	once in three years

Source: Data provided by Sukholozhskcement.

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.
P10	Medium	Calculated as sum of monthly subtotals in Production department reports in a given year. The measurements are based on the monthly inventory reports of remaining raw materials and cement taking into account cement sold. The cement sold is measured by a weighing apparatus. On-site cement, clinker and raw material are measured by volume-to-mass conversion method. The weighing apparatus is calibrated annually. Information will be calculated by the Production department and transferred to the Ecology laboratory.
P11	Medium	Calculated as sum of monthly subtotals in Production department reports in a given year. The measurements are based on the monthly inventory of remaining raw materials and cement taking into account cement sold. The cement sold is measured by a weighing apparatus. On-site cement, clinker and raw materials are measured by volume-to-mass conversion method. The weighing apparatus is calibrated annually. Information will be calculated by the Production department and transferred to the Ecology laboratory.
P14	Medium	Natural gas supplier's laboratory will carry out the measurement of NCV of gas supplied and issue a Certificate. The Chief Power Engineer Department will store these certificates and will calculate the weighted average value of the Net Calorific Value at the end of each year and will pass calculation results to the Ecology laboratory.
P15	Medium	Fuel consumption for existing cement production will be recorded and controlled by the Chief Power Engineer Department using fuel meters calibrated and maintained in line with Russian regulations (certification test is made once in a three years) and will pass the data to the Ecology laboratory.
P17	Medium	Fuel consumption for new cement production will be recorded and controlled by Chief Power Engineer Department using fuel meters calibrated and maintained in line with Russian regulations (certification test is made once in a three years) and will be transferred to Ecology laboratory.
P19	Medium	Electricity consumption will be recorded and controlled by Chief Power Engineer Department using electricity meters and will be transferred to Ecology laboratory. The metering is made by the automatic system for commercial accounting of power consumption. Meters are calibrated in line with the Russian regulations once in a six years.
P20	Medium	Electricity consumption will be recorded and controlled by Chief Power Engineer Department using electricity meters and will be transferred to Ecology laboratory. The metering is made by the automatic system for commercial accounting of power consumption. The meters are calibrated in line with the Russian regulations once in six years.

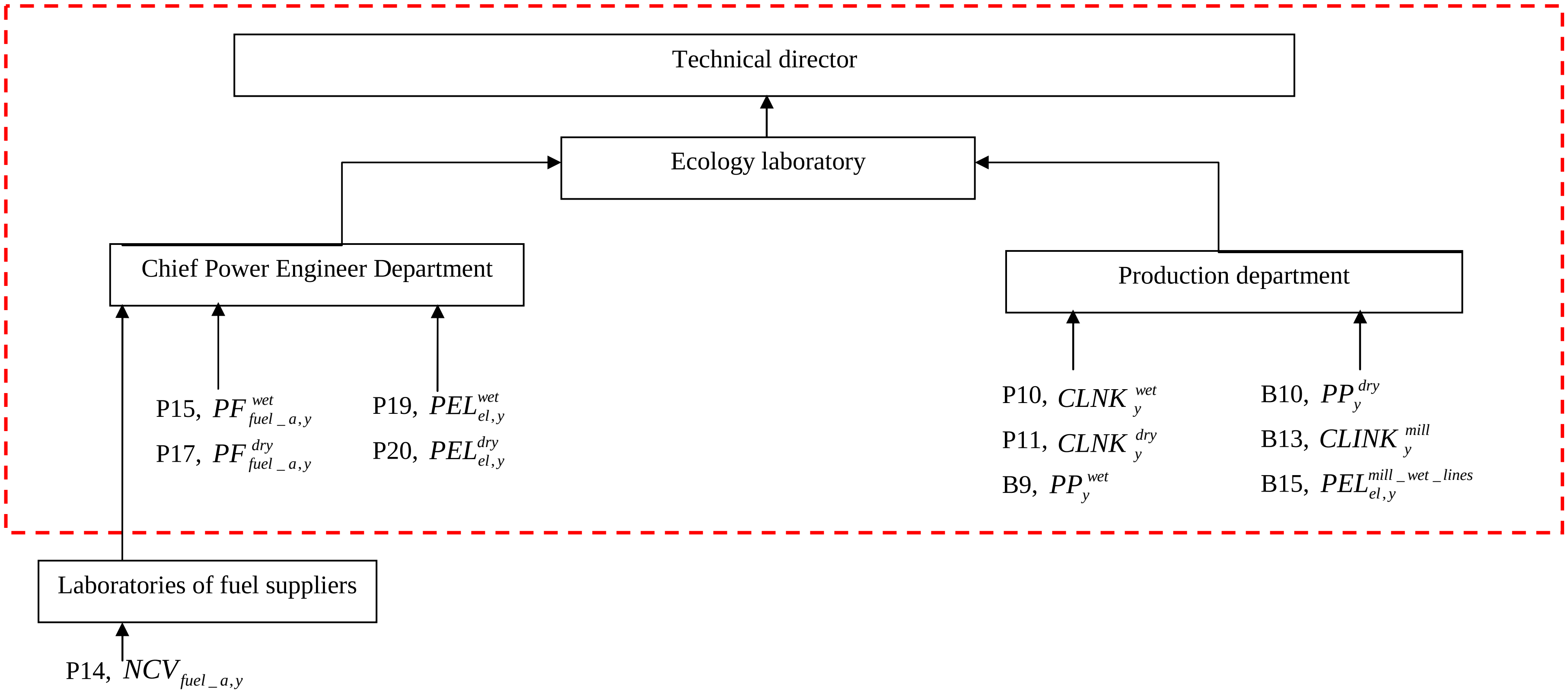
D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
B9	Medium	Calculated as sum of monthly subtotals in Production department reports in a given year. Production department report is based on the monthly inventory of remaining raw materials and cement taking into account cement sold. The cement sold is being measured by a weighing apparatus (scales). On-site cement and clinker are measured by volume-to-mass conversion method. The weighing apparatus is calibrated annually. The information will be calculated by the Production department and transferred to the Ecology laboratory.
B10	Medium	Calculated as sum of monthly subtotals in Production department reports in a given year. Production department report is based on the monthly inventory of remaining raw materials and cement taking into account cement sold. The cement sold is being measured by a weighing apparatus (scales). On-site cement and clinker are measured by volume-to-mass conversion method. The weighing apparatus is calibrated annually. The information will be calculated by the Production department and transferred to the Ecology laboratory.
B13	Low	Total sum of daily reports (per year) of Production department are based on constant measurement of clinker transported from wet lines to the dry (new) line cement production. The amount of clinker transported will be documented in the form of Acceptance Certificates. The information will be obtained by the Production department and transferred to the Ecology laboratory.
B15	Low	The electricity consumption will be recorded and controlled by the Chief Power Engineer Department using electricity meters and will be transferred to the Ecology laboratory. The metering is made by the automatic system for inside accounting of power consumption. The meters are calibrated in line with the Russian regulations once in a six years.

The internal quality system at Sukholozhskcement is functioning in accordance with the national standards and regulations in force. Electricity and gas meters for commercial accounting and master gages are calibrated by accredited organizations. Plant meters are calibrated by master gages. Certificated automatic system for commercial accounting of power consumption introduced at Sukholozhskcement. Also this system is planned to introduce for new cement line.

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

The scheme of monitoring data collection at Sukholozhskcement is described in Figure D.3.1.

Figure D.3.1: Data collection, quality assurance and monitoring at Sukholozhskcement



Source: Sukholozhskcement

Collecting the information for monitoring purposes will be done on the three follow levels:

1) Technical director

The Technical director is responsible for both short and long term production strategy planning and implementation. The Chief Engineer will hold the overall responsibility for implementation of the monitoring plan and will check annual monitoring reports of Ecology laboratory.

2) Ecology laboratory

The Ecology laboratory will be responsible for Monitoring plan implementation and logs keeping, i.e. for organizing and storing the data and the calculation of the emission reductions. It will also prepare the annual monitoring reports to be presented to the verifier of the emission reductions. These reports will be submitted to Technical director. Other departments of Sukholozhskcement will submit relevant data to Ecology laboratory. It will also store the data received from external organizations for three years for the purpose of the independent financial audit. Monitoring results will be kept at least for two years after the last transfer of project ERUs. In addition to the preparation of the monitoring reports, the department will conduct an internal audit annually to assess project performance and, if necessary, make corrective actions.

3) Production department

Production department is responsible for accounting, controlling and planning of raw materials, produced semi and final products. It collects stores and treats this data. The data relevant to the project comprises raw materials, additives, clinker and cement products. It will be regularly submitted to Ecology laboratory for project supervision.

Chief Power Engineer Department

Chief Power Engineer Department is responsible for control of fuel and electricity consumption at Sukholozhskcement. It collects data from the individual electricity meters installed at the production units that consume electricity, and the data of the commercial electricity meter that belongs to the regional power distribution company and measures the overall electricity consumption at the plant. The data from individual electricity meters is cross-checked with the data of the commercial meter. For monitoring purposes, Chief Power Engineer Department will report fuel consumption of new and existing cement lines and data received from external organizations to Ecology Laboratory.

The following independent external organizations will provide the data necessary for Monitoring plan:

1) The laboratory of the Gas transportation organization (Uraltransgaz division of Gasprom)

This laboratory is a fuel supplier. The laboratory will provide data on the Net Calorific Value of the natural gas consumed with its certificate.

Global Carbon will visit Sukholozhskcement for preparation of the monitoring report, template and the manual (two months before the project commissioning).

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

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SECTION E. Estimation of greenhouse gas emission reductions

Technical wet lines capacity is 2.6 million tonnes of cement a year. Average cement production for the last three years is 2.3 million tonnes cement. It is directly proportional to cement demand. Expected demand for cement is outlined in Table E.1 below. Forecast on cement demand is based on data provided by plant researchers. Demand for cement is produced onto the existing wet lines and the dry line that is going to be built.

The annual emission reductions below remain constant if the cement production in the project scenario is between 1.3 million t cement and 2.6 million t cement. With lower than 1.3 million tonnes cement less wet capacity will be replaced and the emission reduction will decrease accordingly.. With higher production of 2.6 million tonnes cement incremental capacity and will replaced (having a lower emission factor than wet capacities) and the emission reduction will decrease accordingly. See Figure A.2.1 for a visualisation.

Table E.1: Expected demand for cement

	Unit	2010	2011	2012
Demand for cement	t/year	1,690,000	1,950,000	2,300,000

Source: Sukholozhskcement

Table E.2: Cement production in the project scenario

Cement Production	Unit	2010	2011	2012
Dry line	t/year	580,000	1,300,000	1,300,000
Wet lines	t/year	1,110,000	650,000	1,000,000
Total	t/year	1,690,000	1,950,000	2,300,000

Source: Sukholozhskcement

E.1. Estimated project emissions:

Table E.1.1: Estimated project emissions within the crediting period

Project emissions	Unit	2010	2011	2012
Dry line (new)	[tCO_2/y]	387,191	867,843	867,843
Wet lines (existing)	[tCO_2/y]	913,964	535,204	823,391
Total	[tCO_2/y]	1,301,155	1,403,047	1,691,234
Total 2010 - 2012	[tCO_2]	4,395,436		

Table E.1.2: Estimated project emissions after the crediting period

Project emissions	Unit	2013	2014	2015	2016	2017	2018	2019	2020
Dry line (new)	[tCO_2/y]	867,843	867,843	867,843	867,843	867,843	867,843	867,843	867,843
Wet lines (existing)	[tCO_2/y]	823,391	823,391	823,391	823,391	823,391	823,391	823,391	823,391
Total	[tCO_2/y]	1,691,234	1,691,234	1,691,234	1,691,234	1,691,234	1,691,234	1,691,234	1,691,234
Total 2013-2020	[tCO_2]	13,529,868							

E.2. Estimated leakage:

Not applicable

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

Table E.3.1: Estimated project emissions including leakage within the crediting period

Project emissions	Unit	2010	2011	2012
Dry line (new)	[tCO_2/y]	387,191	867,843	867,843
Wet lines (existing)	[tCO_2/y]	913,964	535,204	823,391
Total	[tCO_2/y]	1,301,155	1,403,047	1,691,234
Total 2010 - 2012	[tCO_2]	4,395,436		

Table E.3.2: Estimated project emissions inclusive leakage after the crediting period

Project emissions	Unit	2013	2014	2015	2016	2017	2018	2019	2020
Dry line (new)	[tCO_2/y]	867,843	867,843	867,843	867,843	867,843	867,843	867,843	867,843
Wet lines (existing)	[tCO_2/y]	823,391	823,391	823,391	823,391	823,391	823,391	823,391	823,391
Total	[tCO_2/y]	1,691,234	1,691,234	1,691,234	1,691,234	1,691,234	1,691,234	1,691,234	1,691,234
Total 2013-2020	[tCO_2]	13,529,868							

E.4. Estimated baseline emissions:

Table E.4.1: Estimated baseline emissions for the project within the crediting period

Baseline emissions	Unit	2010	2011	2012
Wet lines	[tCO_2/y]	1,391,531	1,605,612	1,893,799
Emissions from incremental production	[tCO_2/y]	0	0	0
Total	[tCO_2/y]	1,391,531	1,605,612	1,893,799
Total 2010 - 2012	[tCO_2]	4,890,942		

Table E.4.2: Estimated baseline emissions for the project after the crediting period

Baseline emissions	Unit	2013	2014	2015	2016	2017	2018	2019	2020
Wet lines	[tCO_2/y]	1,893,799	1,893,799	1,893,799	1,893,799	1,893,799	1,893,799	1,893,799	1,893,799
Emissions from incremental production	[tCO_2/y]	0	0	0	0	0	0	0	0
Total	[tCO_2/y]	1,893,799	1,893,799	1,893,799	1,893,799	1,893,799	1,893,799	1,893,799	1,893,799
Total 2013-2020	[tCO_2]	15,150,392							

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

Table E.5.1: Difference representing the emission reductions of the project within the crediting period

Emission reductions	Unit	2010	2011	2012
Total	[tCO_2/y]	90,375	202,565	202,565
Total 2010 - 2012	[tCO_2]	495,506		

Table E.5.2: Difference representing the emission reductions of the project after the crediting period

Emission reductions	Unit	2013	2014	2015	2016	2017	2018	2019	2020
Total	[tCO_2/y]	202,565	202,565	202,565	202,565	202,565	202,565	202,565	202,565
Total 2013 - 2020	[tCO_2]	1,620,523							

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

Table E.6.1:Project, baseline, and emission reductions within the crediting period

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO_2 equivalent)
Year 2010	1,301,155	0	1,391,531	90,375
Year 2011	1,403,047	0	1,605,612	202,565
Year 2012	1,691,234	0	1,893,799	202,565
Total (tonnes of CO_2 equivalent)	4,395,436	0	4,890,942	495,506

Table E.6.2: Project, baseline, and emission reductions after the crediting period

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emission reductions (tonnes of CO_2 equivalent)
Year 2013	1,691,234	0	1,893,799	202,565
Year 2014	1,691,234	0	1,893,799	202,565
Year 2015	1,691,234	0	1,893,799	202,565
Year 2016	1,691,234	0	1,893,799	202,565
Year 2017	1,691,234	0	1,893,799	202,565
Year 2018	1,691,234	0	1,893,799	202,565
Year 2019	1,691,234	0	1,893,799	202,565
Year 2020	1,691,234	0	1,893,799	202,565
Total (tonnes of CO_2 equivalent)	13,529,868	0	15,150,392	1,620,523

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:

Cement production has a certain impact on the local environment. In Russia emission levels in industry are regulated by operating licenses issued by the regional offices of Ministry of Natural Resources and Environment of Russian Federation on an individual basis for every enterprise that has significant impact on the environment. Current levels of main pollutants emissions (dust, sulphur oxides and nitrogen oxides) are in compliance with requirements of the plant's operating license. Specific consumption of new dry kiln will be twice lower than existing wet kiln, thus contributing to a reduction of such pollutants like CO and NO_x.

Environmental Impact Assessment (EIA) in Russia is regulated by the Federal Law “On the Environmental Expertise” and consists of two stages EIA (OVOS –in Russian abbreviation) and state environmental expertise (SEE). Significants changes into this procedure were made by the Law on Amendments to the Construction Code which enforced as of January 1st, 2007. This Law reduced the scope of activities subject to SEE, transferring them to so called State expertise (SE) done in line with the Article 49 of the Construction Code of RF. In line with the Construction code the Design Document should contain Section “Environment Protection”. Compliance with the environmental regulations (so called technical regiment in Russian on Environmental Safety) should be checked during the process of SE. In absence of the above mentioned regulations the compliance is checked in a very general manner.

Switching from wet to dry process of cement production at Sukholozhskcement is subject to SE at the regional level. To accelerate project implementation, design document was split into two parts. The first part covered construction of crusher plant, pre-blending storage, drying and grinding equipment, kiln and clinker storage. Approval from Glavgosexpertiza of Russia was received in January 2008 for this stage. This document contains Section “Environment Protection”, that specifies project environmental impact.

Second part covers installation of cement mills, additives storage, cement silages, transporting equipment, carriages defrost equipment. Design document was submitted to Glavgosexpertiza of Russia in April 2009. General conclusions provided in the Section”Environment Protection” of these two documents are presented below. Also in this Section, follow measures were developed to prevent harmful environmental operation activities.

1. Air protection:
   - Installation modern gas-cleaning units;
   - Sealing of material and raw material feeding;
   - Loading process automation.
2. Protection of underground and surface water:
   - Reduction of water consumption (dry process cement production);
   - Recycling water supply for equipment cooling;
   - Collection and cleaning of waste water.
3. Protection of land resources:
   - Collection and utilisation of dangerous wastes;
   - Usage of existing infrastructure.

Calculation of maximum ground level concentration in Section “Environment Protection” was made by standardized programme “PDV-ECOLOG” in accordance with OND-86 (“Methodology of calculation of harmful substances content in free air, contained in plants emissions” Goskomgydromet RF, 1987).
According to the calculation, a following conclusion was made:

- Maximum ground level concentration of all pollution and summation groups does not exceed maximum permitted concentration limits on border of the sanitary zone and in residential construction;

- Affected zone represents circle: 23 km. for benzpyrene; 24 km. for nitrogen oxide; 24 km. for silicon dust.

Current and projected levels of the main pollutant emissions are presented in Table F.1.1. The project level emissions were calculated for the situation when existing kilns and new kiln operated together.

Table F.1.1: Level of the main pollutant emissions

Pollution	Unit	Existing level		Project level	
		sanitary zone	residential construction	sanitary zone	residential construction
Nitrogen dioxide	Fractions of maximum permitted concentration limits	0.43	0.41	0.44	0.41
Nitrogen oxides	Fractions of maximum permitted concentration limits	0.59	0.58	0.59	0.58
Odorant	Fractions of maximum permitted concentration limits	0.04	0.01	0.18	0.1
Dust (20-70% SiO_2)	Fractions of maximum permitted concentration limits	0.7	0.48	0.72	0.48
Dust (up to 20% SiO_2)	Fractions of maximum permitted concentration limits	0.2	0.08	0.87	0.31

Source: Data provided by Sukholozhskcement

Expected Sukholozhskcement pollution by contaminant was calculated in the Section “Environmental Protection” of the Design document and presented in Table F.1.2.

Table F.1.2: Established standard of overall emissions

N	Monitored pollutants	Maximum permissible emission, tonnes per year
1	Iron oxide	0.042
2	Manganese compounds	0.002
3	Carbon	39.393
4	Dust	1807.847
5	Nitrogen dioxide	576.323
6	Nitrogen oxide	104.218
7	Sulfur dioxide	50.708
8	Carbon monoxide	231.384
9	Fluorides gaseous	0.001
10	Methane	0.572
11	Benzpyrene	0.0008
12	Kerosene	94.067
13	Emulsin	0.00008

Source: Data provided by Sukholozhskcement.

Analysis of calculations done for pollutants dispersion in to the atmosphere from emissions sources at “Suhkologskcement” facilities, adjusted for projected dry cement line, showed that maximum concentrations of pollutants in the lower atmospheric layers are not exceeding maximum permitted concentration limits for all instances considered, and are not exceeding one for the summing groups. There is no additional air protection policies required. Because established standards of maximum permissible emission in to the atmosphere for emissions sources are fixed at the level of the actual emission values. Project does not considerably contaminate environment.

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:

As it is shown in Section F1 project does not have significant negative environmental impact.

SECTION G. Stakeholders' comments

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

Administration of Sukhoy-Log and Bogdanovich region approved land dedication for the project construction in April 2006. In September 2006 Sukholozhskcement signed a contract with OJSC "Sibniiproektcement". There was a public hearing at Sukholozhskcement on the 28th November 2006 dedicated to construction of the new cement production line in accordance with Federal laws N 7-FZ from 10/01/2002 (About environment protection) and N 174-FZ from 23/11/1995 (About environmental impact audit). Project received a public consent for cement plant construction, with condition that it will comply with all environmental requirements. OJSC "Sibniiproektcement" developed environmental policies in Section "Environmental Protection" of Design Documents. In January 2008 "The Main Agency of the State expertise" (FGU "Glavgosexpertiza" in Russian abbreviation) approved construction of the new cement production line (Positive conclusion of FGU "Glavgosexpertiza" N 4-07-252, 30 January 2008).

Sukholozhskcement provided stakeholders with project information. Sukholozhskcement had publications about the project in mass media. List of publications is presented below.

- Newspaper: "Narodnoe Slovo" 31/10/2006, article - The most important construction project of the region;
- Newspaper: "Zavodskie Vesty" December 2006, article - The town is waiting a new cement line;
- Official website of Sukhoy-Log municipal administration, article - New cement line construction has started;
- BetonMarket.ru, article - Sukholozhskcement continues new cement line construction.

Annex 1

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Annex 2

BASELINE INFORMATION

Project design

Current situation

Sukholozhskcement operates four wet lines of cement production. Its average annual production is about 2.3 million tonnes of cement for the last three years period. But Sukholozhskcement can produce about 2.6 million tonnes of cement per year (2,270,000 tonnes of clinker), it corresponds to the technical capacity of wet lines (kilns) ($CLNK_{cap}^{BL}$). The volume of actual cement production depends on the demand for cement.

Proposed new line and process layout

New dry line of cement production with capacity of 1.3 million tonnes per year will be installed, while production of the four existing wet lines will be reduced to 1.0 million tonnes of cement after startup of the new dry line at technical capacity. Therefore the incremental production will be expected to be zero. But in case of increased cement demand, total project cement production (dry and wet lines) will be increased too.
The following values were defined and fixed during PDD development:

EF_{fuel_a} Emission factor of fuel of type *a* is defined by IPCC 2006;

EF_{fuel_b} Emission factor of fuel of type *b* is defined by IPCC 2006;

$NCV_{fuel\_b,y}$ Net calorific value of fuel of type *b* in year *y* is defined by IPCC 2006;

$D_{fuel\_b,y}$ Density of fuel of type *b* in year *y* is defined by Sukholozhskcement;

$CLNK_{cap}^{BL}$ Technical clinker capacity of the existing on-site wet kilns is defined by the Design document;

$EF_{dec,y}$ Default emission factor (tCO_2/t clinker).

Baseline for incremental production

A baseline for the JI project has to be set in accordance with Appendix B of the annex to decision 9/CMP.1 (hereinafter referred to as “JI guidelines”), and, in particular, the “Guidance on criteria for baseline setting and monitoring”[18] developed by the Joint Implementation Supervisory Committee (JISC) (hereinafter referred to as “Guidance”).

A baseline shall be established on a project-specific basis and/or using a multi-project emission factor.

If a baseline is established on a project-specific basis, the project participants may apply approved CDM baseline and monitoring methodologies (paragraph 20 (a) of the Guidance) or establish a baseline that is in accordance with appendix B of the JI guidelines, also using selected elements or combinations of approved CDM baseline and monitoring methodologies or approved CDM methodological tools, as appropriate (paragraph 20 (b) of the Guidance).

For cement industry four approved CDM baseline and monitoring methodologies are exist: ACM0003, ACM0015 (consolidating AM0033 and AM0040) and AM0024. None of these methodologies can be applied directly to the project which foresees a process switch combined with an increase in production, but these methodologies have been carefully evaluated to identify the main principles underlying the approach to baseline setting, additionality and monitoring.

[18] See http://ji.unfccc.int/Ref/Guida.html.

Furthermore, the approach regarding baseline setting is applied for JI project “Switch from wet-to-dry process at Podilsky Cement, Ukraine” (JI Track 2 reference number: 0001), determination of which is deemed final, with expectation of production rate on its maximum technical capacity.

On this basis, a JI specific approach regarding baseline setting and monitoring has been developed in accordance with Appendix B of the JI Guidelines and the JISC’s Guidance.

Approach to identify the baseline

The baseline for a JI project is the scenario that reasonably represents the anthropogenic emissions by sources (or anthropogenic removals by sinks) of GHGs that would occur in the absence of the proposed project.

If no approved CDM baseline and monitoring methodology is applied, in accordance with paragraph 21 (b) of the Guidance, plausible future scenarios have to be identified and listed on the basis of conservative assumptions. These alternatives are assessed whether or not to be credible and reasonable and the most plausible alternative is identified as the baseline. Consistency between the baseline scenario and the additionality assessment shall be checked.

As shown in Section B.1. above, the most plausible baseline scenario is that the existing cement production lines would be kept and third Party producers would satisfy cement demand instead.

In this case, the baseline consists of two parts:

- Production at the existing kilns (replacement production);
- Production by other cement plants (incremental production)

Replacement production

Clinker production in the non-incremental part of the baseline scenario has to be defined. It is assumed that, in the baseline scenario, existing facility will operate based on cement demand, but no more than its maximum technical capacity; if the actual production in the project scenario exceeds the existing maximum technical capacity.

Clinker production in the non-incremental part of the baseline scenario is calculated according to the following formula:

$$CLNK_y^{BL} = MIN[CLNK_y^{PR}, CLNK_{cap}^{BL}] \quad (1)$$

Where:

$CLNK_y^{BL}$ Clinker production in the baseline scenario on the existing wet kilns in year *y* (tonnes);

$CLNK_y^{PR}$ Total clinker production in the project scenario in year *y* (tonnes);

$CLNK_{cap}^{BL}$ Technical clinker capacity of the existing wet kilns (tonnes).

Cement production in the baseline scenario on the existing kilns in year *y* is calculated as follows:

$$BP_y^{BL} = \frac{PP_y^{PR}}{CLNK_y^{PR}} \times CLNK_y^{BL} \quad (2)$$

Where:

BP_y^{BL} Cement production in the baseline scenario on the existing kilns in year *y* (tonnes);

$CLNK_y^{PR}$ Clinker production in the project scenario in year *y* (tonnes);

PP_y^{PR} Total cement production of cement in the project scenario in year y (tonnes);

Regarding the replacement of the existing production capacity, in the baseline the characteristics of the existing facility are used.

The parameters and formulae applied to calculate emissions of the non-incremental part of the baseline scenario are presented in Section D. above. Emission factor of wet cement production for it will be monitored continuously after the project start up.

Incremental production

<u>Methodological approach</u>

Cement production in the incremental part of the baseline scenario is calculated as follows:

$$BP_y^{incr} = PP_y^{PR} - BP_y^{BL} \quad \text{; in case if } PP_y^{PR} = BP_y^{BL} \text{ then } BP_y^{incr} = 0 \qquad (3)$$

Where:

BP_y^{incr} Incremental cement production in the baseline scenario in year *y* (tonnes).

Baseline emissions of the incremental production are calculated on the basis of displaced cement production by the third party producers. An approach needs to be developed how such a counterfactual situation can be constructed while remaining transparent and conservative.

Cement industry is a transparent market where standardized types of cement products exist. Within a certain region or country cement can be transported from a producer to a consumer.

A similar situation exists in an electricity system where electricity can be transported from a producer to a consumer without significant transmission constraints. Given the similarity, the following approach takes into account the underlying principles of the "Tool to calculate the emission factor for an electricity system" (version 01.1) (hereinafter referred to as "CDM Tool"), adopted by the CDM Executive Board, which deals with capacity additions to the electricity grid.

However, it needs to be accounted for that cement, inter alia due to transportation costs, is not delivered over huge distances. In Ural part of Russia average distance of cement deliveries is approximately 554 km.[19] Therefore; those changes in cement production at one plant will not affect production at another cement plant located at 1108 km. Also we select only 10 nearest cement plants that will interact among themselves (according to "CDM Tool"). Generally, an influence is more likely will involve the nearby plant.

[19] See OJSC "NIICEMENT", Russian cement industry in 2006.

If the JI project is not implemented, the incremental production will be covered by other cement producers and will result in corresponding emissions, i.e.:

1. Other cement plants that exist within a radius of 1,108 km (operating margin or OM);
2. New cement capacities to be built within a radius of 1,108 km (build margin or BM).[20]

Operating margin (OM) emission factor

It is not feasible to define exactly which of the existing cement plants would produce the incremental amount of cement. The most transparent approach is to calculate weighted average of specific CO_2 emissions of the nearest 10 cement plants within a radius of 1,108 km (or all, if less than 10 exist). The result will represent an emission factor expressed in tCO_2/t cement.

The OM emission factor is calculated by taking into account the following emissions:

1. Emissions from fuel consumption;
2. Emissions from calcination;
3. Emissions from electricity consumption.

$$OM_y = \frac{EF_{el,y} \times EL_{OM,y} + EF_{dec,y} \times CLNK_{OM,y} + \sum_i EF_{fuel\_i} \times NCV_{fuel\_i,incr} \times FUEL_{OM,i,y}}{CEM_{OM,y}} \quad (4)$$

Where:

$EF_{el,y}$ Grid emission factor in year y (tCO_2/MWh);

$EL_{OM,y}$ Total electricity consumption by the cement plants in the OM in year y (MWh);

$EF_{dec,y}$ Default emission factor (tCO_2/t clinker)[21];

$CLNK_{OM,y}$ Total clinker production by the cement plants in the OM in year y (tonnes);

EF_{fuel_i} Carbon emission factor of kiln fuel i (tCO_2/GJ);

$NCV_{fuel\_i,incr}$ Net calorific value of kiln fuel i (GJ/tonne or 1000 m^3);

$FUEL_{OM,i,y}$ Total fuel consumption of kiln fuel i by the cement plants in the OM in year y (tonnes or 1000 m^3);

$CEM_{OM,y}$ Total cement production by the cement plants in the OM in year y (tonnes).

The OM_y emission factor can either be calculated and fixed ex-ante for the whole crediting period, or estimated ex-ante and monitored and calculated ex-post.

[20] The BM defines the new capacity additions whose production would be substituted, i.e. which new production capacity would not be realized because of the project. This is estimated by taking into account the specifics of the most recently built plants/capacity additions.

[21] Cement Sustainability Initiative (CSI) of the World Business Council for Sustainable Development (WBCSD) 2005, CO_2 Accounting and Reporting Standard for the Cement Industry, www.wbcsd.org

Build margin (BM) emission factor

In the project absence, a competitor might decide to build a new cement plant or extend an existing cement production capacity to meet the market demand. It is not feasible to define exactly which new cement plant/capacity addition would be built and produce the incremental amount of cement. Four options can be applied to calculate the BM emissions:

a) The five most recent capacity additions built within the last 10 years within a radius of 1,108 km are taken into account. This approach is applicable if relevant capacity additions can be observed;
b) Alternatively, five new capacity additions planned in the near future within a radius of 1,108 km can be taken into account, if their implementation is realistic/probable. If more capacity additions are planned, proximity is decisive;
c) Provided objective data exist, it can be assumed, for reasons of conservativeness, that an installation would be built based on Best Available Technology (BAT) of cement production;
d) If no recent capacity additions will take place within a radius of 1,108 km and it is unclear which new installations will be built, or when, it is reasonable and most realistic to assume the BM emission factor to be zero ex-ante, but monitor it during the crediting period ex-post. In this context, five most recent capacity additions built within last 10 years in 1,108 km radius (or all, if less than 5 exist) were accounted for, in accordance with the formula below.

$$BM_y = \frac{EF_{el,y} \times EL_{BM,y} + EF_{dec,y} \times CLNK_{BM,y} + \sum_i EF_{fuel\_i} \times NCV_{fuel\_i,incr} \times FUEL_{BM,i,y}}{CEM_{BM,y}} \quad (5)$$

Where:

$EL_{BM,y}$ Total electricity consumption at the cement plants in the BM in year *y* (MWh);

$CLNK_{BM,y}$ Total clinker production at the cement plants in the BM in year *y* (tonnes);

$FUEL_{BM,i,y}$ Total fuel consumption of kiln fuel *i* at the cement plants in the BM in year *y* (tonnes or 1000 m^3);

$CEM_{BM,y}$ Total cement production at the new cement plants in the BM in year *y* (tonnes).

The BM_y emission factor can either be calculated and fixed ex-ante for the whole crediting period, or estimated ex-ante and monitored and calculated ex-post in case of option a), it is fixed ex-ante in case of options b) and c), and it is monitored and calculated ex-post in case of option d).

Combined margin (CM) emission factor

The CM emission factor is calculated by weighing the OM emission factor and the BM emission factor on a 50 % / 50 % basis, as recommended by the CDM Tool.

$$CM_y = \frac{OM_y + BM_y}{2} \qquad (6)$$

Where:

CM_y CM emission factor for incremental cement production (tCO_2/t cement)

CM emission factor is used for estimating/calculating the baseline emissions of the incremental production, unless the BM emission factor is zero, as described in option d) above. Later on, only the OM emission factor is taken into account.

Generally, CM emission factor can either be calculated and fixed ex-ante for the whole crediting period, or estimated ex-ante and monitored and calculated ex-post.

JI projects with a final positive determination under the JI Track 2 procedure and projects approved under the JI Track 1 procedure[22] and shown accordingly on the UNFCCC JI website are excluded from the sample units for the OM/BM/CM emission factor calculation.

If data required to calculate the OM/BM/CM emission factors for the year y is usually available six months later after the end of the year y, alternatively emission factors of the previous year (y-1) may be used. If data is available latter than 18 months after the end of year y, emission factors of the year preceding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout the crediting period.

This methodological approach can be freely reproduced and used for JI projects if proper reference to the source is made.

[22] Under the JI Track 1 procedure, it is the sole responsibility of the host Party to verify emission reductions (or enhancements of removals) as being additional to any that would otherwise occur.

Application of methodological approach

Background data for OM emission factor calculation

Average distance of cement transportation in Urals region of Russia is 554 km[23]. This means that changes in cement production at one plant will not induce any influence at cement production by another plant located at 1108 km distance. Information on the nearest ten cement plants within a radius of 1,108 km from the project site is presented in Table Anx.2.3 and Figure Anx.2.1 below:

Table Anx.2.3: Background information on the nearest ten cement plants

No.	Plant	Location (City)	Production method	Fuel	Cement production in 2006 (thousand tonnes)
1	OJSC Sukholozhskcement	Sukhoy-Log	wet	gas	2,307.4
2	CJSC Nevyansky cementnik	Nevyanovsk	dry	gas	1,127.7
3	OJSC Uralcement	Pervomaiskii	wet	gas	1,368.0
4	OJSC Gornozavodskcement	Gornozavodsk	wet	gas	1,503.0
5	OJSC Soda, Sterlotamakskoye	Sterlotamak	wet	gas	982.0
6	OJSC Katavaskiy cement	Katav-Ivanovsk	dry	gas	1,138.8
7	OJSC Magnitogorskiy cementno-ogneuporniy plant	Magnitogorsk	wet	gas	500.0
8	OJSC Novotroitsky cement plant	Novotroitsk	wet	gas	727.5
9	OJSC Ulyanovskcement	Novoulyanovsk	wet	gas	1,523.6
10	OJSC Volskcement	Volsk	wet	gas	2,388.1
Total cement production in 2006					13,316.1

Source: OJSC "NII Cement"

An investigation was conducted to estimate an average kiln efficiency of these cement plants and average electricity consumption. Data was processed accordingly to obtain OM emission factor in 2006, it is equal to 0.774 tCO_2/t cement.

The OM_y emission factor is estimated ex-ante and monitored and calculated ex-post.

This influence area (see Figure Anx.2.1) includes OJSC Pashiyskiy metallurgical-cement plant (11) and OJSC Jigulevskie story-material plant (12), these plants are not taken into account because:

- OJSC Pashiyskiy metallurgical-cement plant has small contribution to the cement industry, its annual cement capacity is about ten thousand tonnes;
- OJSC Jigulevskie story-material plant is located about 880 kilometers from Sukhoy-Log, its average distance of cement transportation is only 290 km[24], that restricts plant's influence

[23] OJSC NII Cement (Cement Research Studies Institute), "Russian cement industry in 2006", 2007

[24] OJSC NII Cement (Cement Research Studies Institute), "Russian cement industry in 2006", 2007

Figure Anex.2.1: Influence area

Source: http://en.18dao.net/images/f/f0/Map-Russia.jpg

Background data for BM emission factor calculation

Only three new cement capacities were constructed in Russia since 1992, they are placed:

- OJSC Mordovcement (Komsomolskiy, 2008) dry method is used;
- OJSC Soda (Sterlitomak, 2007), dry method;
- OJSC Magnitogorskiy cementno-ogneuporniy plant (Magnitogorsk, 2007), wet method.

These cement capacities are located in the relevant geographical area within the radius of 1,108 km from the project site (less than 1,108) And only OJSC Mordovcement project of new dry kiln may get JI status. Therefore there are two new cement capacities without JI status which be observed during the last 10 years within relevant geographical area.

CM emission factor

It is unlikely that Sukholozhskcement will produce more cement, than its existing wet lines technical capacity because of the economic crisis. Thus incremental capacity will not be used in the calculation of emission reductions in the near future and therefore OM and BM emission factors will not be needed. If project capacity will exceed existing technical capacity, the OM and BM emission factors will be estimated ex-ante and monitored and calculated ex-post. The CM emission factor will be defined on a 50:50 (OM:BM) basis.

The technical transmission and distribution losses of electricity

Total quantity of project electricity consumption is 223,313 MWh per year (for 2011).

In the baseline there are two components of cement production:

- Replacement (2.3 mln. tonnes of cement per year);
- Incremental (0.0 mln. tonnes of cement per year).

Baseline electricity consumption for replacement part of cement production is 255,564 MWh per year (for 2011). Incremental capacity will not be used in the calculation of emission reductions. Thus total baseline electricity consumption is 255,564 MWh per year.

The project electricity consumption is less than baseline electricity consumption and the project technical transmission and distribution losses are less than the baseline technical transmission and distribution losses.

Therefore the technical transmission and distribution losses were not have taken into account in emission calculations. It is conservative.

Standardized electricity grid emission factor

In this PDD, a standardized CO_2 emission factor is used to calculate emissions related to electricity consumption in the project and baseline scenarios.

Standardized CO_2 emission factors were elaborated for Russian power systems in the Study commissioned by "Carbon Trade and Finance SICAR S.A.".

Based on approved CDM "Tool to calculate the emission factor for an electricity system" (version 01.1), operating, build and combined margin emission factors were calculated for seven regional Russian electricity systems (RESs). Within these RESs no major transmission constraints exist, while they operate at the same time relatively "independently" from each other (i.e. electricity exchange between regional systems is rather insignificant).

For the PDD at hand, emission related characteristics of the relevant regional electricity system, RES "Urals", the largest unified power system of the national energy system of Russia, were taken into account.

For calculation of emissions related to electricity consumption in the project and baseline scenarios, combined margin emission factor for RES "Urals" was applied and fixed ex-ante:

$EF_{el,y}$ = 0.602 tCO_2/MWh.

The whole Study is available on request. Global Carbon will adjust this emission factor annually using new data obtained from ROSTAT RF.

Annex 3

MONITORING PLAN

See Section D. for monitoring plan details.

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