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

CONTENTS

Annexes

SECTION A. General description of the project

A.1. Title of the project:

Reconstruction of the metallurgical plant at the Chelyabinsk Metallurgical Plant OAO, Chelyabinsk, Russia

Sectoral scope: (9) Metal production

Version: 02.2

Date: 23.04.2012

A.2. Description of the project:

The reconstruction project of the Chelyabinsk Metallurgical Plant OAO (ChMK) is implemented in order to increase the output of high-quality steel products by utilizing modern metallurgical technologies which ensure high level of energy and environmental efficiency.

ChMK is Russia's largest enterprise of a full metallurgical cycle producing quality and high-quality steel.

ChMK produces a wide range of metallurgical products: pig iron, semi-finished steel for further processing, section and sheet rolled metal products made of carbon, structural, tool and rust-resisting steel grades. The plant's products are used in the following areas: space and aviation, atomic energy, heavy, chemical, energy, automotive and agricultural engineering, bearing and pipe plants, construction, manufacture of medical equipment, tools, as well as in other industries. The largest consumers of the ChMK products are: steel trading companies, pipe plants, automobile factories, hardware plants and other machine-building enterprises.

ChMK is a part of Mechel Group which comprises around 30 mining, steel, ferroalloys and power enterprises both in Russia and abroad.[1]

Situation existing prior to the starting date of the project

ChMK is a full metallurgical cycle enterprise which includes all metallurgical treatments from lumping iron ore raw materials to production of rolled products. The main production facilities are sintering plant (4 sintering machines with area of 138 m^2 each), blast-furnace plant (3 blast furnaces with useful volume of 5,1 thousand m^3), oxygen-converter plant (3 oxygen-converters with capacity of 160 tons), arc-furnace plant #2 (electric arc furnace with a capacity of 100 tons), arc-furnace plant #6 (electric arc furnace with a capacity of 100 tons), rolling plants #2-5. Casting of steel produced at the oxygen-converter plant prior to the project implementation was carried out mainly into molds and partially at CCM-2 of the arc-furnace plant #6, at the arc-furnace plant #2 - into molds, at the arc-furnace plant #6 - at continuous casting machines (CCM-1, CCM-2) and into molds. Ingots produced in steel furnaces were cogged down at the rolling plant #3 on mill 1250-3 / continuous billet mill until billets were ready for further rolling.

Project scenario

The project scenario includes a complex of ChMK measures aimed at metallurgical production reconstruction by way of introduction of continuous casting and secondary metallurgy at the oxygen-converter plant and arc-furnace plant #6:

– Construction of CCM-3, LF-2 (ladle furnace) at the oxygen-converter plant;

[1] ChMK characteristic has been prepared based on the data from the Mechel official web site. Source: http://www.mechel.ru/

– Construction of CCM-4, LF-3 at the oxygen-converter plant;

– Construction of CCM-5, LF-4 and vacuum vessel at the oxygen-converter plant;

– Renewal of CCM-2, installation of LF-2 and vacuum vessel at arc-furnace plant #6.

Due to reconstruction of the ChMK metallurgical production, the steel produced at the oxygen-converter plant undergoes ladle treatment and casting primarily on continuous casting machines (CCM-2, 3, 4, 5).A continuous cast steel billet is transferred to rolling plants or sold in the form of marketable products. Part of the melted steel is casted into molds and rolled at rolling plant #3 on mill 1250-3 / continuous billet mill until billets are ready. The main sintering, blast-furnace, steelmaking and rolling plants production facilities of ChMK have remained unchanged after the project implementation.

History of the project

Reconstruction of the ChMK metallurgical production was performed in a stagewise manner during 2002-2011: construction of CCM-3, LF-2 during 2002-2004, construction of CCM-4, LF-3 during 2004-2009; construction of CCM-5, LF-4 and a vacuum vessel during 2007-2012, renewal of CCM-2 and construction of LF-2 and a vacuum vessel during 2007-2011.[2]

Decisions on the implementation and financing of the project aimed at reconstruction of the ChMK metallurgical production were taken in compliance with joint implementation of the Kyoto Protocol in order to attract additional investments. The main stages of the project implementation include:

– 2002: Decision of complex CCM-3 at the oxygen-converter plant construction using the joint implementation mechanism of the Kyoto Protocol;[3]

– 2004: Decision of complex CCM-4 at the oxygen-converter plant construction using the joint implementation mechanism of the Kyoto Protocol;[4]

– 2006: Decision of continuation of project implementation under the joint implementation mechanism and beginning of the CCM-2 and CCM-5 complexes construction using the Kyoto Protocol mechanism;[5]

– 2007-2008: Consultation with the consulting companies in area of joint implementation in Russia;[6]

– 2009-2010: Organization and holding of a tender for ChMK's projects elaboration under the joint implementation mechanism;[7]

– 2011: Signing of a contract with a consulting company for the projects elaboration under the joint implementation mechanism.[8]

[2] More detailed information on the project timeline, including the implementation schedule are provided in the section A.4.2 of the PDD.

[3] The business plan for the installation of continuous casting machine at JSC Mechel dated on February 2002.

[4] Protocol of the meeting for review the technical and economic assessment of CCM-4 construction dated on 05.02.2004.

[5] Protocol of meeting by the general director of CJSC "UC Mechel" dated on 20.12.2006.

[6] Confirmed by the letters between Mechel and consulting companies in 2007-2008.

[7] Agency contract between Mechel JSC and ChMK #086/M-09 dated on 01.07.2009 about tender organization. Letter #M/0349/MC/06 dated on 26.03.2010 about agency contract implementation.

[8] Letter #UCM/0357/AD dated on 08.08.2011 about contact signing with a consulting company for project joint implementation.

Baseline scenario

The baseline scenario is the continuation of the situation existing before the project implementation: mainly production of rolled billets from the steel melted at the oxygen-converter plant by casting it into molds and subsequent rolling of ingots at rolling plant #3 on mill 1250-3 / continuous billet mill and partly production of continuous cast steel billets on CCM-2 of arc-furnace plant #6. In the baseline scenario the main sintering, blast-furnace, steelmaking and rolling plants production facilities of ChMK have remained unchanged as it was prior to the project implementation.

Development of the project according to the baseline scenario ensures steel product output and quality equal to those of the project scenario.

Reduction of greenhouse gases emissions

Implementation of ChMK project has a complex effect expressed in increased output of high quality steel products, reduction of raw materials, fuel and energy consumption for manufacture of steel products, reduction of negative impact on the environment, including reduction of greenhouse gas emissions.

Reduction of greenhouse gas emissions compared to the situation prior to the project implementation is achieved by reducing fuel, raw materials and energy consumption as a result of ladle furnace treatment and continuous casting of steel.

Expected emission reduction due to the ChMK project implementation during the crediting period (2008-2012) will amount to 5 885 148 tons of CO_2-equivalent or an average of about 1 177 030 tons of CO_2-equivalent per year.

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 Russian Federation (Host Party)	• Chelyabinsk Metallurgical Plant OAO	No
Party B Not determined[9]	• -	-

The written project approval will be received from the Parties involved after the project determination by accredited independent entity (AIE).

A.4. Technical description of the project:

A.4.1. Location of the project:

The project is located in Chelyabinsk, Chelyabinsk region, Russian Federation.

[9] Party B is not determined on the moment of PDD elaboration and will be determined later.

A.4.1.1. Host Party(ies):

Russian Federation

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

Chelyabinsk region.

Location of Chelyabinsk region on the map of Russian Federation is shown on the fig. A.4-1.

Fig. A.4-1. Russian Federation, Chelyabinsk region

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

Chelyabinsk

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

The project is implemented at the site of ChMK located in the northern part of Chelyabinsk in the industrial zone. For details of the project location on a map of the Chelyabinsk region see Fig. A.4-2. Geographical coordinates of the project: 55° 15' N, 61° 25' E.[10]

[10] Source: Google Earth 6.1

Fig. A.4-1. Chelyabinsk region, ChMK

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

Reconstruction of the metallurgical production at ChMK includes introduction and expansion of the continuous casted billets manufacture and secondary metallurgy at the oxygen-converter plant and arc-furnace plant #6.

Situation existing prior to the project implementation

The ChMK oxygen-converter plant includes three oxygen-converters with capacity of 160 tons and liquid metal output of 138-142 tons. The steel melted at the oxygen-converter plant was casted mainly into molds and partially at CCM-2 of the arc-furnace plant #6. Steel ingots were rolled through the blooming to produce rolled billets for further processing.

Arc-furnace plant #6 was equipped with one arc-furnace with a capacity of 100-120 tons, argon-oxygen refining plant (AOR) for stainless steel, one ladle furnace (LF-1), two single-strand slab CCM (CCM-1, CCM-2).

Project measures at the **oxygen-converter plant** include:

1. CCM-3 and LF-2 installation with the following specifications:

– two-position ladle furnace (LF-2) with a 32 MVA transformer for complex refining of liquid steel in a 160 ton ladle with a capacity of 140 tons of metal by chemical composition and temperature using jet degassing (argon), addition of ferroalloys and other materials, with an output of up to 1,2 million tons per year;

– blooms 6-strand CCM (CCM-3) with a mold bend of 9 meter radius and an intermediate ladle of 30,4 ton capacity and an output of 1 million tons of billets per year having section of 100 x 100 mm and 9,12 m length.

2. CCM-4 and LF-3 installation with the following specifications:

– two-position ladle furnace (LF-3) with a 32 MVA transformer for complex refining of liquid steel in a 160 ton ladle with a capacity of 142 (155) tons of metal by chemical composition and temperature using jet degassing (argon, nitrogen), addition of ferroalloys and other materials, with an output of up to 1,2 million tons per year;

– blooms 6-strand CCM (CCM-4) with a mold bend of 9 meter radius and an intermediate ladle of 30.4 ton capacity and an output of 1 million tons of billets per year having section of 100 x 100 or 180 x 180 mm and 6-12 m length.

3. CCM-5, LF-4 and a vacuum vessel with the following specifications:

– two-position ladle furnace (LF-4) with a 32 MVA transformer for complex refining of liquid steel in a 160 ton ladle with a capacity of 142 (155) tons of metal by chemical composition and temperature using jet degassing (argon, nitrogen), addition of ferroalloys and other materials, with an output of up to 1,2 million tons per year;

– double-chamber vacuum vessel with one vapor ejector vacuum station and a moving cover for steel refining in a ladle with a capacity of 130-155 tons of molten metal under high-vacuum with argon bottom blowing and output of up to 1 million tons per year;

– blooms 5-strand radial CCM (CCM-5) with a mold bend of 12 meter radius and an intermediate ladle of 30 ton capacity and an output of 1 million tons of billets per year having section of 180 x 180 mm and 300 x 360 mm.

The oxygen-converter plant technological scheme includes the following steps: smelting of semi-finished or finished steel in oxygen converters → processing of steel (if necessary) in a ladle furnace (LF-2, LF-3, LF-4) → steel degassing (if necessary) in a ladle → continuous casting of steel (CCM-3, CCM-4, CCM-5) or casting into molds.

Project measures at the **arc-furnace plant #6** include **renewal of CCM-2, installation of LF-2 and vacuum vessel** with the following specifications:

– single-position ladle furnace (LF-2) with a 25(32) MVA transformer for complex refining of liquid steel in a ladle with a capacity of 110-142 tons of metal by chemical composition and temperature using jet degassing (argon, nitrogen), addition of ferroalloys and other materials;

– double-chamber vacuum vessel (vacuum oxidizing degasser) with one moving cover for steel refining in a ladle with a capacity of 110 tons of molten metal under high-vacuum with argon and oxygen blowing;

– single-strand slab continuous casting machine (CCM-2, new) with a mold bend of 9 meter radius for casting of up to 1,2 million tons / year into billets having section of 170-250 x 1050-1550 mm in length and of 4-12 m at a casting speed of 0,8-1,6 m / min.

Installation of new equipment at arc-furnace plant #6 made it possible to retain already existing equipment, namely EAF, LF-1, AOR, CCM-1, and decommission CCM-2 (old).

Technological scheme arc-furnace plant #6 includes the following steps:

1) Stainless steel production of up to 180 thousand tons per year based on the following scheme: smelting of semi-finished product in an electric arc furnace (EAF) → steel processing in the argon-oxygen refining plant (AOR) → vacuum-oxygen degassing of steel in a chamber vacuum vessel → continuous casting of steel (CCM-1 and CCM-2);

2) Dynamo, pipe and structural steel production of up to 470 thousand tons per year based on the following scheme: smelting of semi-finished product in an electric arc furnace (EAF) or receipt of metal from the oxygen-converter plant → processing of steel in ladle furnaces (LF-1 and LF-2) → steel degassing in a ladle → continuous casting of steel (CCM-1 and CCM-2);

3) Other steel grades production of up to 550 thousand tons per year based on the following scheme: smelting of semi-finished product in an electric furnace (EAF) or receipt of metal from the oxygen-converter plant → processing of steel in ladle furnaces (LF-1 and LF-2) → continuous casting of steel (CCM-1 and CCM-2).

The following basic types of raw materials and energy are used in production of steel at the ChMK oxygen-converter plant and arc-furnace plant #6: pig iron, steel scrap, ferroalloys, electrodes, lime, natural gas, oxygen, nitrogen, argon, electricity. Pig iron is produced at the ChMK blast-furnace plant, technical gases are produced at the ChMK oxygen-compressor facility, other types of raw materials are supplied by third parties.

DANIELI (Italy) is a **supplier of the main equipment** (CCM-2, CCM-3, CCM-4, CCM-5, LF-2, LF-3, LF-4, chamber vacuum vessels of the oxygen-converter plant and arc-furnace plant #6).

Technological equipment, used in the ChMK project, is **consistent with the modern level of** metallurgical production because utilization of continuous casting and secondary metallurgy allows for production of high-quality finished products of required range.

Industrial process control and maintenance of metallurgical equipment is performed by the ChMK properly trained and qualified specialists in accordance with approved procedure and regulations.

The implementation schedule of the project is presented in the diagram A.4-1.

Diagram A.4-1. Implementation schedule of the project.

#	Project measures		Year									
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1.	CCM-3, LF-2											
2.	CCM-4, LF-3, vacuum vessel											
3.	CCM-2, LF-2, vacuum vessel											
4.	CCM-5, LF-4, vacuum vessel											

The project implementation schedule is compiled in accordance with the following documents:

– Certificate of Completion for «Oxygen-Converter Plant. Continuous Casting of Steel. Phase 1» approved by the Acceptance Committee in July 2004;

– Certificate of Completion for «Oxygen-Converter Plant. CCM-4 Complex» approved by the Acceptance Committee in February 2007;

– Certificate of Completion for «Oxygen-Converter Plant. CCM-4 Complex. Phase 2. Stage 1, LF-3 installation» approved by the Acceptance Committee in December 2009;

– Certificate of Completion for «Arc furnace plant #6. CCM Reconstruction. Installation of LF and Vacuum Vessel. Increase in production of casted billets to 1 200 000 tons per year», approved by the Acceptance Committee in February 2011;

– Provisional Acceptance Certificate on CCM-5 dated on 26.01.2012; Provisional Acceptance Certificate on Ladle furnace dated on 09.02.2012.

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:

Greenhouse gas emissions by iron and steel plants are mainly associated with the use of fossil fuels and carbonaceous feed in manufacture of steel products.

Implementation of the ChMK metallurgical production reconstruction project by introducing technologies and equipment for ladle treatment and continuous casting of steel allows for an increase of metal output (steel billets) compared to the situation prior to the project implementation. Therefore, after the project implementation, manufacture of the same amount of steel billets requires a smaller amount of steel, fuel, raw materials, and energy consumed at all the preceding stages. Thus, the achieved reduction in fuel, raw materials, and energy consumption leads to a corresponding reduction in greenhouse gas emissions.

Main indicators of production and greenhouse gas emissions for baseline and project scenarios allowing for leakage are presented in Table A.4.3-1. A detailed description of greenhouse gas emissions is set out in Section B and E of the PDD.

Table A.4.3-1. Steel production and CO_2 emissions (average data for 2008-2012)

#	Parameter	Baseline scenario	Project scenario with leakages	Change
1.	Steel billets production, t/year	3 578 164	3 578 164	-
2.	Specific emissions, tCO_2/t	2,097	1,768	0,329
3.	Emissions, tCO_2/year	7 503 247	6 326 217	1 177 030

The existing legislation of the Russian Federation which regulates greenhouse gas emissions does not provide for restriction of business activities which lead to occurrence of greenhouse gas emissions. Therefore, the ChMK metallurgical production reconstruction project may adopt any of the possible scenarios allowing for acceptable level of production. In the absence of opportunities to attract additional investment through the Kyoto protocol, the project would have been developed in accordance with the baseline scenario (the baseline scenario selection is chosen and justified in the Section B.1-B.2), and this would not have led to a reduction in greenhouse gases emissions.

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

	Years
Length of the crediting period	5 years (60 months)
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent.
2008	971 772
2009	1 034 229
2010	1 103 942
2011	1 149 425
2012	1 625 780
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	5 885 148
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	1 177 030

Table A.4.3-1. Estimated amount of emission reductions after the first commitment period.

	Years
Length of the crediting period	8 years (96 months)
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent.
2013	1 625 780
2014	1 625 780
2015	1 625 780
2016	1 625 780
2017	1 625 780
2018	1 625 780

2019	1 625 780
2020	1 625 780
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	13 006 240
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	1 625 780

A.5. Project approval by the Parties involved:

The Project is not approved by the Parties involved. The Letters of Approval will be received after the project determination by AIE.

According to the Regulations "On Realization of Article 6 of Kyoto Protocol to United Nations Framework Convention on Climate Change" approved by the Government Decree № 780 dated on 15.09.2011 the project shall be approved following the positive determination of the project by an AIE.

SECTION B. Baseline

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

Description and justification of the baseline chosen is provided in accordance with Guidance on criteria for baseline setting and monitoring (Version 03).[11]

The **JI specific approach**[12] is used for description and justification of the baseline chosen that includes the following steps:

1. Indication and description of the approach chosen regarding baseline setting
2. Application of the approach chosen

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

The JI specific approach for baseline setting is elaborated in accordance with Appendix B of the JI guidelines[13] and paragraph 23 through 29 of the Guidance on criteria for baseline setting and monitoring (Version 03). The baseline is identified by listing and describing plausible future scenarios on the basis of conservative assumptions and selecting the most plausible one taking into account the key factors that affect a baseline.

The **following steps** are implemented for baseline setting:

1. Identification and description of plausible future scenarios

At this stage the plausible future scenarios are defined and checked if they are in line with the current legislation and if they are available to the project participants.

2. Analysis of the key factors that affect the implementation of the plausible future scenarios

The key factors are directly or indirectly factors to the plausible future scenarios that affect their implementation. The following factors considered as the key factors that affect the plausible future scenarios implementation: financial and investment barriers (the description and application of the mentioned key factors are provided by Step 2 of the approach chosen). The other factors stated in the paragraph 25 of the Guidance on criteria for baseline setting and monitoring (Version 03) cannot be considered as the key factors that affect the baseline.

3. Selecting the most plausible scenario

This stage results in defining of the baseline. The baseline is the most attractive plausible future scenario.

Step 2. Application of the approach chosen

1. Identification and description of plausible future scenarios

The list of the plausible future scenarios shall be developed according to the following terms:

- all plausible future scenarios shall be available to the project participants;
- all plausible future scenarios shall be provide outputs in comparable quantities and with comparable quality and properties.

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[11] Source: http://ji.unfccc.int

[12] In accordance with paragraph 9(a) “Guidance on criteria for baseline setting and monitoring”, (Version 02). The approved CDM methodologies are not used for choice, justification and setting of the baseline.

[13] Source: http://ji.unfccc.int

The list of plausible future scenarios

Plausible future scenario 1. Project implementation without registration as a JI project. Mainly production of continuous casted billets from the steel smelted in ChMK oxygen-converter plant.

Plausible future scenario 2. Continuation of the current situation.[14] Mainly production of rolled billets from the steel smelted in ChMK oxygen-converter plant.

Description of plausible future scenarios

Plausible future scenario 1

The plausible future scenario 1 includes a complex of ChMK measures aimed at metallurgical production reconstruction by way of introduction of continuous casting and secondary metallurgy at the oxygen-converter plant (CCM-3, CCM-4, CCM-5, LF-2, LF-3, LF-4, vacuum vessel) and at the arc-furnace plant #6 (renewal of CCM-2, installation of LF-2 and vacuum vessel).

Implementation of this scenario allows for increase in production of continuous casted billets from the steel made at the oxygen-converter plant. Total design capacity of the new equipment shall be 4.8 million tons of continuous casted billets per year. The product grades include blooms with section of 100 x 100 mm, 180 x 180 mm and 300 x 360 mm, as well as slabs with section of 170-250 x 1050-1550 mm. The main sintering, blast-furnace, steelmaking and rolling plants production facilities of ChMK have remained unchanged.

Plausible future scenario 2

The plausible future scenario 2 is the continuation of the of the current situation: mainly production of rolled billets from the steel smelted at the oxygen-converter plant by casting it into molds and subsequent rolling of ingots at rolling plant #3 on mill 1250-3 / continuous billet mill and partly production of continuous cast steel billets on CCM-2 of arc-furnace plant #6. The main sintering, blast-furnace, steelmaking and rolling plants production facilities of ChMK have remained unchanged.[15] The plausible future scenario 2 provides to the output with comparable steel and product grades as in future scenario 1.

The description of the plausible future scenarios shows that scenarios 1 and 2 are available to the project participants and provide outputs in comparable quantities and with comparable quality and properties.

Compliance of the chosen scenarios with the current legislation and regulations

The development of metallurgical companies in Russia is determined by the Russian metallurgy development strategy up to 2020, approved by the Ministry of Industry and Trade of the Russian Federation order #150 on March 18, 2009. The primary goal of the development of the metallurgical industry is to satisfy the demand for metallurgical products in terms of the product range, quality and quantity, and with regard to increased economic efficiency in the industry, environmental safety, as well as resource and energy conservation.

This means that the production of steel products at ChMK according to any scenario that ensures the output with the required quantity and quality conforms to the development strategy goals and objectives. Plausible future scenarios 1 and 2 are in compliance with the current legislation.

There are no laws that restrict greenhouse gases emissions at metallurgical companies in Russia. The main documents that regulate greenhouse gas emissions in the metallurgical industry are:

[14] Further it will be shown that plausible future scenario 2 is a baseline.

[15] Confirmed by the Reference of Technical Department of ChMK.

- Climate Doctrine of the Russian Federation, approved by the President of the Russian Federation resolution #861on December 17, 2009;
- Russian metallurgy development strategy up to 2020, approved by the Ministry of Industry and Trade of the Russian Federation order #150 on March 18, 2009;
- Russian Government Decree #780 dated on September 15, 2011 "On Realization of Article 6 of Kyoto Protocol to United Nations Framework Convention on Climate Change".

The mentioned documents envisage the reduction of greenhouse gas emissions in the industry through the technological reconstruction, the introduction of energy saving technologies, and the creation of the conditions in which projects can be implemented under the Kyoto Protocol. However, they do not contain any regulatory measures on emissions reduction. Therefore plausible future scenarios 1 and 2 are in compliance with the current regulations in the field of environmental protection.

List of the plausible future scenarios corresponding to the current legislation and available to the project participants

Plausible future scenario 1. Project implementation without registration as a JI project. Mainly production of continuous casted billets from the steel smelted in ChMK oxygen-converter plant.

Plausible future scenario 2. Continuation of the current situation. Mainly production of rolled billets from the steel smelted in ChMK oxygen-converter plant.

2. Analysis of the key factors that affect the implementation of the plausible future scenarios

The key factors are directly or indirectly factors to the plausible future scenarios that affect their implementation.

The list of the key factors:

- Investment barrier;
- Financial barrier (cost efficiency).

Definition of the key factors

Investment barrier

Investment barrier represents the availability of own or dept capital for financing the project.

Financial barrier (cost efficiency)

The presence of a financial barrier for a specific scenario means that economic parameters of the scenario are not acceptable for the project participants.

The presence of the above barriers for implementation of future scenarios means that they may not be implemented if there is a more profitable scenario or there is no possibility of overcoming them.

Analysis of the key factors that affect the implementation of the plausible future scenarios

Investment barrier

Attracting the required investments of around 14.1 billion rubles was a significant barrier to the ChMK for metallurgical production reconstruction aimed at increasing the production of continuous casted billets from the steel smelted in ChMK oxygen-converter plant (plausible future scenario 1).

Absence of a timely opportunity to attract the required amount of own and dept financing for implementation of metallurgical plant reconstruction project has led to a significant increase in the period of project implementation.[16]

[16] Order #42-p of UK "Mechel" dated on 22.10.2008 "On Extension of the Timeline for the Current Investment Projects Implemented at the "UK Mechel"

Lowering of investment barrier through government support is not possible due to the lack of public investment in the projects of steel companies.[17]

Therefore, *an investment barrier is present for plausible future scenario 1:* Project implementation without registration as a JI project. Mainly production of continuous casted billets from the steel smelted in ChMK oxygen-converter plant.

The Russian Metallurgical Industry Development Strategy for the period till 2020 stipulates that metallurgical production reconstruction and construction projects are financed mainly by the enterprises themselves, moreover, income derived from projects implemented under Kyoto Protocol joint implementation mechanism may be used as an additional source of funding. The explanation of how registration of the project as a JI project will reduce the effect of the investment barrier is provided in the section B.2.

The investment barrier does not affect the implementation of the plausible future scenario 2 (Continuation of the current situation. Mainly production of rolled billets from the steel smelted in ChMK oxygen-converter plant) because this scenario does not require any additional investments.

Financial barrier (cost efficiency)

Analysis of cost efficiency has been performed for the plausible future scenario 1 in order to assess the impact of the financial barrier. Plausible future scenario 2 does not require any additional investments because it is a continuation of the current situation. *Alternative scenario 2 does not have any financial barrier.*

Analysis of cost efficiency has been performed for the plausible future scenario 1 in accordance with the stages of reconstruction of the ChMK metallurgical plant:

1. Construction of CCM-3 and LF-2 at the oxygen-converter plant;
2. Construction of CCM-4 at the oxygen-converter plant;
3. Construction of LF-3 at the oxygen-converter plant;
4. Construction of CCM-5, LF-4 and vacuum vessel at the oxygen-converter plant;
5. Renewal of CCM-2, installation of LF-2 and vacuum vessel at arc-furnace plant #6.

Analysis of cost efficiency of the projects under the plausible future scenario 1, performed for the conditions which existed at the time of deciding on the issue of project implementation, shows that the plausible future scenario 1 is not acceptable to the project participants. Results of the analysis are shown in Table B.1-1 - B.1-5. Calculation of cost efficiency of the plausible future scenario 1 is executed in Excel format.[18]

[17] Russian metallurgic industry development strategy for the period till 2020 approved by the Decree of the Ministry of Industry and Trade of Russia #150 dated 18.03.2009, pp. 42-44.

[18] Calculations are provided in MS Excel files: Investment analysis_CCM-2.xls, Investment analysis_CCM-3, Investment analysis_CCM-4.xls, Investment analysis_CCM-4 LF-3.xls, Investment analysis_CCM-5.xls

Table B.1-1. Results of cost efficiency analysis of the plausible future scenario 1: Construction of CCM-3 and LF-2 at the oxygen-converter plant

№	Parameter	Value
1.	Investment, million rubles	1 585,7
2.	Discount rate, %	7,0
3.	Internal Rate of Return, %	3,9

Table B.1-2. Results of cost efficiency analysis of the plausible future scenario 1: Construction of CCM-4 at the oxygen-converter plant

№	Parameter	Value
1.	Investment, million rubles	2 885,0
2.	Discount rate, %	2,1
3.	Internal Rate of Return, %	0

Table B.1-3. Results of cost efficiency analysis of the plausible future scenario 1: Construction of LF-3 at the oxygen-converter plant

№	Parameter	Value
1.	Investment, million rubles	1 145,4
2.	Discount rate, %	12,0
3.	Internal Rate of Return, %	12,9
4.	Acceptable Internal Rate of Return , % (more than)[19]	20,0

Table B.1-4. Results of cost efficiency analysis of the plausible future scenario 1: Construction of CCM-5, LF-4 and vacuum vessel at the oxygen-converter plant

№	Parameter	Value
1.	Investment, million rubles	5 592,5
2.	Discount rate, %	12,0
3.	Internal Rate of Return, %	0
4.	Acceptable Internal Rate of Return , % (more than)	20,0

[19] Acceptable Internal Rate of Return for the investment projects implemented at Mechel Company is determined by Protocol of Investment Committee Mechel OAO dated on 26.12.2006.

Table B.1-5. Results of cost efficiency analysis of the plausible future scenario 1: renewal of CCM-2, installation of LF-2 and vacuum vessel at arc-furnace plant #6

№	Parameter	Value
1.	Investment, million rubles	2 867,9
2.	Discount rate, %	12,0
3.	Internal Rate of Return, %	16,6
4.	Acceptable Internal Rate of Return , % (more than)	20,0

Economic performance indicators of plausible future scenario 1 for each project are not acceptable to the project participants, as internal rate of return on the projects is below the discount rate or below the established criteria for implementation of investment projects in the Company. Therefore, the performed analysis shows *presence of significant financial barrier for implementation of plausible future scenario 1*.

The project will be an efficient and financially stable one, if under all possible development scenarios the project performance indicators remain acceptable.[20] To confirm the findings of the analysis of cost efficiency of plausible future scenario 1, a sensitivity analysis has been performed.[21] Results of the sensitivity analysis show that if the investment and operating costs deviate within ± 10% plausible future scenario 1 will remain unattractive.

3. Choice of the most plausible future scenario – baseline

The results of the performed analysis of the key factors affected the plausible future scenarios make it possible to draw the conclusion that the most plausible future scenario is the plausible future scenario 2: Continuation of the current situation. Mainly production of rolled billets from the steel smelted in ChMK oxygen-converter plant. The plausible future scenario 2 is the **baseline.**

The baseline GHG emissions are established using the following formulae:

$$BE_y = BE_{BOFP,y} + BE_{EAFP,y} + BE_{BFP,y} + BE_{SP,y} + BE_{RP,y}$$

BE_y - baseline emissions, tCO_2

$BE_{BOFP,y}$ - baseline emissions in oxygen-converter plant, tCO_2

$BE_{EAFP,y}$ - baseline emissions in arc-furnace plant #6, tCO_2

$BE_{BFP,y}$ - baseline emissions in blast-furnace plant, tCO_2

$BE_{SP,y}$ - baseline emissions in sintering plant, tCO_2

$BE_{RP,y}$ - baseline emissions in rolling plant #3, tCO_2

y - year

[20] Methodological recommendations for the evaluation of investment projects, approved by the Ministry of Economy of Russia, Ministry of Finance of Russia and Rosstroy of Russia on June 21, 1999 No BK 477, p. 75.

[21] Calculations are provided in MS Excel files: Investment analysis_CCM-2.xls, Investment analysis_CCM-3, Investment analysis_CCM-4.xls, Investment analysis_CCM-4 LF-3.xls, Investment analysis_CCM-5.xls

A detailed description of the formulas used to calculate CO_2 emissions from each emission source is given in Section D.1.1.4 of the monitoring plan. The baseline is established taking into account of uncertainties of parameters and using conservative assumptions. Main parameters used to establish the baseline include the data on production of basic products by emission sources during the crediting period:

- sinter production in sintering plant;
- pig iron production in blast-furnace plant;
- steel production in oxygen-converter plant;
- steel production in arc-furnace plant #6;
- steel ingots rolled in rolling plant #3 on mill 1250-3 / continuous billet mill.

Data / parameter	$P_{sinter,y}$
Data unit	t
Description	Sinter production in sintering plant
Time of determination/monitoring	Yearly according to the monitoring plan
Source of data (to be) used	Report of costs in sintering plant ChMK
Value of data (for ex ante calculations/determinations)	Year: tonnes 2008: 4 751 198 2009: 4 494 921 2010: 4 755 724 2011: 4 578 774 2012: 5 249 996
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Actual data for period 2008-2011 and forecasted data for 2012 prepared by ChMK
QA/QC procedures (to be) applied	Measuring devices for recording hot rolled metal production are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies.
Any comment	The uncertainties of measuring data is low. The additional information is provided in the section D of the PDD.

Data / parameter	$P_{iron,y}$
Data unit	t
Description	Pig iron production in blast-furnace plant

Time of determination/monitoring	Yearly according to the monitoring plan
Source of data (to be) used	Report of costs in blast-furnace plant ChMK
Value of data (for ex ante calculations/determinations)	Year / tonnes: 2008 – 3 500 153; 2009 – 3 804 808; 2010 – 4 148 923; 2011 – 3 728 017; 2012 – 4 160 241
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Actual data for period 2008-2011 and forecasted data for 2012 prepared by ChMK
QA/QC procedures (to be) applied	Measuring devices for recording hot rolled metal production are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies.
Any comment	The uncertainties of measuring data is low. The additional information is provided in the section D of the PDD.

Year	tonnes
2008	3 500 153
2009	3 804 808
2010	4 148 923
2011	3 728 017
2012	4 160 241

Data / parameter	$\mathbf{P_{steel,BOFP,PJ,y}}$
Data unit	t
Description	Steel production in oxygen-converter plant
Time of determination/monitoring	Yearly according to the monitoring plan
Source of data (to be) used	Report of costs in oxygen-converter plant ChMK
Value of data (for ex ante calculations/determinations)	see table below
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Actual data for period 2008-2011 and forecasted data for 2012 prepared by ChMK

Year	tonnes
2008	3 351 143
2009	3 500 513
2010	3 747 762
2011	3 464 448
2012	3 826 923

QA/QC procedures (to be) applied	Measuring devices for recording hot rolled metal production are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies.
Any comment	The uncertainties of measuring data is low. The additional information is provided in the section D of the PDD.

Data / parameter	$\mathbf{P_{steel,EAFP,PJ,y}}$
Data unit	t
Description	Steel production in arc-furnace plant #6
Time of determination/monitoring	Yearly according to the monitoring plan
Source of data (to be) used	Report of costs in arc-furnace plant #6 ChMK
Value of data (for ex ante calculations/determinations)	Year: tonnes 2008: 555 527 2009: 474 086 2010: 647 386 2011: 662 965 2012: 701 257
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Actual data for period 2008-2011 and forecasted data for 2012 prepared by ChMK
QA/QC procedures (to be) applied	Measuring devices for recording hot rolled metal production are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies.
Any comment	The uncertainties of measuring data is low. The additional information is provided in the section D of the PDD.

Data / parameter	$\mathbf{P_{ingots,y}}$
Data unit	t
Description	Steel ingots rolled in rolling plant #3 on mill 1250-3 / continuous billet mill
Time of determination/monitoring	Yearly according to the monitoring plan
Source of data (to be) used	Report of costs in rolling plant #3 ChMK

<table>
<tr><td>Value of data
(for ex ante calculations/determinations)</td><td><table><tr><td>Year</td><td>tonnes</td></tr><tr><td>2008</td><td>2 275 777</td></tr><tr><td>2009</td><td>2 204 645</td></tr><tr><td>2010</td><td>2 332 531</td></tr><tr><td>2011</td><td>1 650 951</td></tr><tr><td>2012</td><td>1 104 104</td></tr></table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods and procedures (to be) applied</td><td>Actual data for period 2008-2011 and forecasted data for 2012 prepared by ChMK</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Measuring devices for recording hot rolled metal production are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies.</td></tr>
<tr><td>Any comment</td><td>The uncertainties of measuring data is low. The additional information is provided in the section D of the PDD.</td></tr>
</table>

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:

JI specific approach is used for demonstration of additionality of the project in accordance with the paragraph 2(a) of the Annex 1 to the "Guidance on criteria for baseline setting and monitoring" (Version 03). The approved CDM methodologies and tools are not used for demonstration of additionality.

The demonstration that the project provides reductions in emissions by sources that are additional to any that would otherwise occur, is provided using the following step-wise approach:

1. Indication and description of the approach applied;
2. Application of the approach chosen;
3. Provision of additionality proofs.

Step 1. Indication and description of the approach applied

A JI-specific approach is chosen for justification of additionality. Guidance on criteria for baseline setting and monitoring prescribes in this case to provide 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.

Step 2. Application of the approach chosen

The analysis provided in the section B.1. clearly demonstrates that the baseline scenario is: Plausible future scenario 2. Continuation of the current situation. Mainly production of rolled billets from the steel smelted in ChMK oxygen-converter plant.

The project is not a part of the baseline, which can be shown by analyzing the key factors that affect the implementation of the plausible future scenario 1 (Project implementation without registration as a JI project). The results of the key factors analysis demonstrate that the project scenario is not part of the identified baseline (table B.2-1).

Table B.2-1. Impact of the barriers on the plausible future scenarios implementation

№	Scenario	Investment barrier	Financial barrier
1.	Plausible future scenario 1 (Project implementation without registration as a JI project)	Present	Present
2.	Plausible future scenario 2 (baseline)	Absent	Absent

Common practice analysis

The common practice analysis completes the analysis of the key factors that affect the implementation of the plausible future scenarios and demonstrate additionality of the project.

In 2000-2012 were implemented the similar projects for continuous casting and secondary metallurgy at Russian metallurgical works:[22]

- OJSC “Magnitogorsk Iron and Steel Works”;
- OJSC “Ural Steel”;
- OJSC “Nizhneserginsky Metizno-Metallurgichesky Plant”;
- OJSC “Ashinskiy Metallurgical Works”;
- CJSC “Chelyabinsk Tube-Rolling Plant”;
- OJSC “Metallurgical Plant named after A.K. Serov”;
- OJSC “Seversky Pipe Plant”.

All the mentioned similar projects are implemented under JI mechanism of Kyoto protocol therefore they can be likely excluded from the analysis of common practice.[23] Therefore the project of ChMK for reconstruction of the metallurgical plant is not a common practice.

Explanation of how registration of the Project as a JI (Joint Implementation) project will reduce the effect of the barriers that prevent the Project being implemented in the absence of the use of the JI mechanism.

The analysis of the barriers showed the presence of investment and financial barriers for the project, including those related to expenditures for their overcoming. Therefore, registering the project as a JI Project and attracting investments by selling emission reduction units (ERU) will assist in overcoming the above barriers and increase the viability of the project:

- Improve credit conditions;
- Improve economic performance indicators of the project.

[22] Source: http://www.sbrf.ru/moscow/ru/legal/cfinans/ , http://www.carbonunitsregistry.ru/reports-pso.htm

[23] Based on a provision for common practice analysis of Methodological tool “Combined tool to identify the baseline scenario and demonstrate additionality” (Version 02.2), p. 9. Source:http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v2.2.pdf

Therefore the registration of the project as a JI project will help to get over the identified barriers.

Step 3. Provision of additionality proofs

The proofs to support above information are contained in the following documents:

- Protocols of decision of project implementation and other relevant documentation from project participants;
- Cost efficiency analysis of the project;
- Relevant studies;
- Legislation and regulations of metallurgy development and JI projects implementation in Russia.

Explanations of how GHG emission reductions are achieved

Reduction of greenhouse gas emissions compared to the situation prior to the project implementation is achieved by reducing fuel, raw materials and energy consumption as a result of ladle furnace treatment and continuous casting of steel. Expected emission reduction due to the ChMK project implementation during the crediting period (2008-2012) will amount to 5 885 148 tons of CO_2-equivalent or an average of about 1 177 030 tons of CO_2-equivalent per year. Detailed description of GHG emission reductions are provided in the section E.

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

In the project boundaries are included all the facilities of ChMK connected to the project activities and where GHG emissions occur.[24]

1. Sintering plant;
2. Blast-furnace plant;
3. Oxygen-converter plant;
4. Arc-furnace plant #6;
5. Rolling plant #3. Mill 1250-3 / CBM.

The facilities included in the project boundaries and their impact on GHG emissions is presented in table B.3-1. The sources of GHG emissions as well as the GHGs included in the calculation of the emissions according to the baseline and project scenarios are presented in table B.3-2. A diagram of the project boundaries is shown in fig. B.3-1.

[24] In the project boundary are not included the ChMK facilities (arc-furnace plant #2, rolling plant #1, 2, 4, 5) as they are not affected by project implementation.

Table B.3-1. The objects in the project boundaries and description of their effect on GHG emissions

#	Facilities	Description
1.	Sintering plant	Sinter production is a process of iron ore raw sintering by burning coke in a layer of sinter-feed mixture. GHG emissions occur as a result of coke combustion, de-carbonation of mixture limestone and combustion of natural gas in order to ignite sinter-feed mixture. Sinter is used in blast-furnace plant for pig iron smelting.
2.	Blast-furnace plant	Pig iron is produced by reduction and smelting of iron which is fed into the furnace in the form of sinter, pellets and lump ore. Use of coke as a reducing agent and utilization of technological fuel leads to formation of blast-furnace gas which, upon its combustion, is the source of GHG emissions. Pig iron is used in steel plants for steelmaking.
3.	Oxygen-converter plant	Oxygen-converter steel is produced by gaseous oxidizer (oxygen) lancing of mixture of hot-metal and scrap steel. GHG emissions occur as a result of oxidation of pig iron carbon and utilization of technological fuel (natural gas) in oxygen converters, secondary metallurgy and steel casting units. Ingots and continuous casted steel billets produced at the oxygen-converter plant are transferred to rolling plants for further processing.
4.	Arc-furnace plant #6	Steel production in electric arc furnaces is provided by smelting of scrap steel and pig iron using the electricity energy supplied through graphite electrodes. GHG emissions occur as a result of oxidation of pig iron carbon, graphite electrodes and burning of technological fuel (natural gas) in furnaces, secondary metallurgy and steel casting units. Ingots and continuous casted steel billets produced at the arc-furnace plant are transferred to the rolling plants for further processing.
5.	Rolling plant #3. Mill 1250-3 / CBM.	Ingots from the oxygen-converter plant and arc-furnace plant #6 are rolled at rolling plant #3 on mill 1250-3 / CBM. GHG emissions occur due to burning of fuel for heating of ingots prior to the rolling.

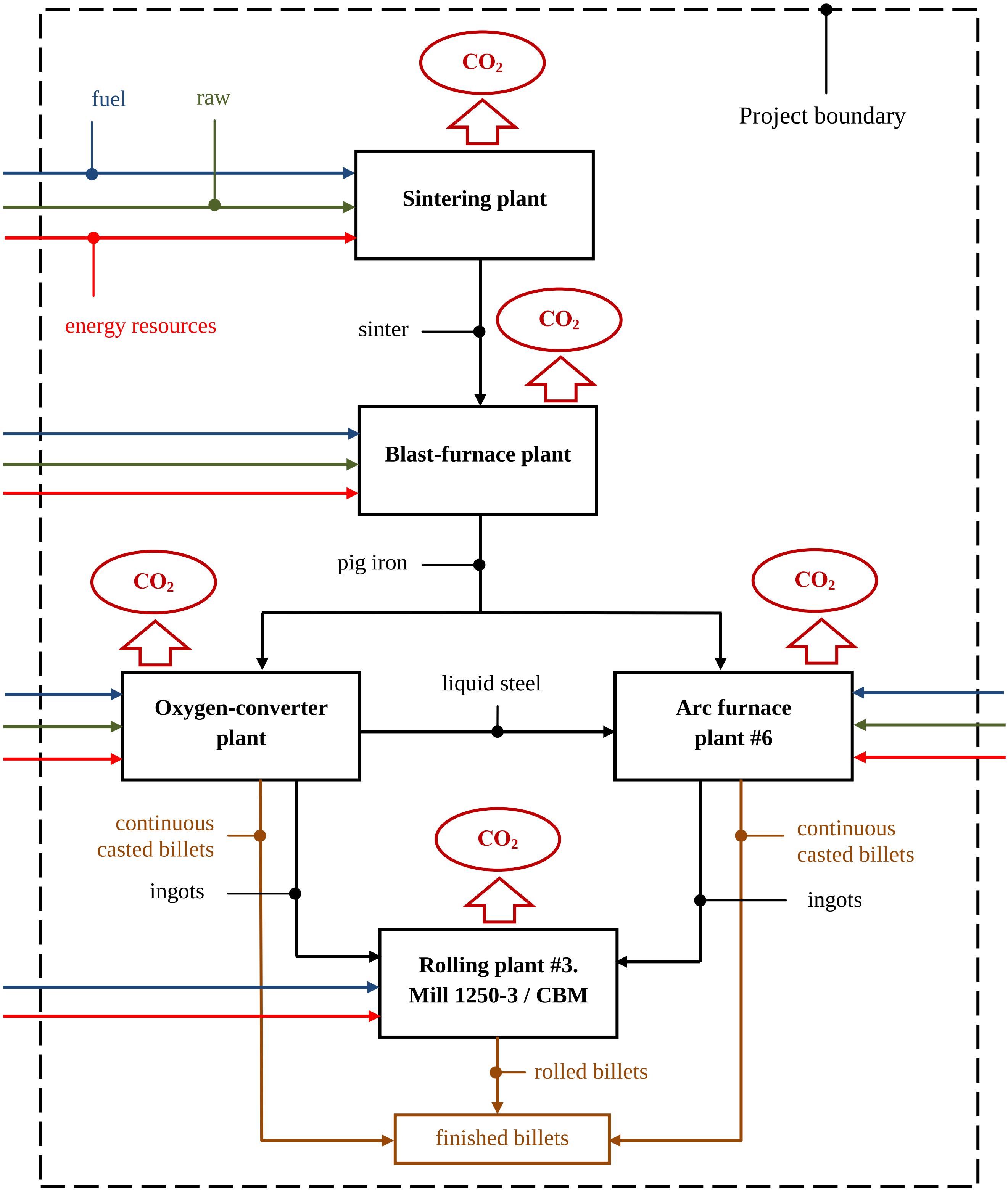
Table B.3-2. Emission sources and GHGs included / excluded in project boundaries

#	Emission sources	Gas[25]	Included / excluded	Description
1.	Sintering plant	CO_2	included	Emissions from fuel combustion and oxidation of carbon contained in raw and materials.
		CH_4	excluded[26]	Conservative approach.
		N_2O	excluded	Conservative approach.
2.	Blast-furnace plant	CO_2	included	Emissions from fuel combustion and oxidation of carbon contained in raw and materials.
		CH_4	excluded	Conservative approach.
		N_2O	excluded	Conservative approach.
3.	Oxygen-converter plant	CO_2	included	Emissions from fuel combustion and oxidation of carbon contained in raw and materials.
		CH_4	excluded	Conservative approach.
		N_2O	excluded	Conservative approach.
4.	Arc-furnace plant #6	CO_2	included	Emissions from fuel combustion and oxidation of carbon contained in raw and materials.
		CH_4	excluded	Conservative approach.
		N_2O	excluded	Conservative approach.
5.	Rolling plant #3. Mill 1250-3 / CBM.	CO_2	included	Emissions from fuel combustion.
		CH_4	excluded	Conservative approach.
		N_2O	excluded	Conservative approach.

[25] According to Guidance on criteria for baseline setting and monitoring (Version 03) the project must consider all the greenhouse gases included in Annex A of the Kyoto Protocol. However, fuel combustion and oxidation of carbonaceous materials only produces emissions of CO_2, CH_4 and N_2O and therefore emissions of SF_6, PCFs, HFCs are not considered. Source of data: 2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 3. Industrial Processes and Product Use, Chapter 4. Metal Industry Emissions, p. 4.9

[26] CH_4 and N_2O emissions from all emission sources in the project and baseline scenario are not taken into account based on conservative approach to the GHG emission reductions calculation. Comments are provided in the table B.3-3.

Fig. B.3-1. Principle scheme of the project boundaries



The GHG emission sources (table B.3-1, B.3-2) are determined according to the requirements of the Guidance on criteria for baseline setting and monitoring (Version 03). The applications of the requirements are provided in the table B.3-3.

Table B.3-3. Requirements for the project boundaries determination

#	Criterion to define the project boundaries	Comments
1.	Under the control of the project participant.	The identified emission sources (sintering plant, blast-furnace plant, oxygen-converter plant, arc-furnace plant #6, rolling plant #3) as it is the property of the Company and it is directly controlled by the Company. The project implementation results in changes of GHG emissions outside the project boundary (e.g., production of coke, pellets, electricity etc.). Taken into account that these facilities are not under control of ChMK, emissions at these facilities are considered as leakages due to project activities.
2.	Reasonably attributable to the project.	Sources of GHG emissions, defined in the table. B.3-1, are connected by energy and material flows with the facilities where the project is implemented (see Figure B.3-1), so they are reasonably attributable to the project.
3.	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.	Emissions by the considered sources (sintering plant, blast-furnace plant, oxygen-converter plant, arc-furnace plant #6, rolling plant #3) are significant, they amount is more than 1% and exceed 2,000 t of CO_2 equivalent (see section E.) In the project boundaries are not considered CH_4 and N_2O emissions based on conservative approach to the GHG emission reductions calculation while the project provides to the all GHG emissions reductions as result of fuel, raw materials and energy resources consumption decrease.

Leakage assessment

In accordance with Guidance on criteria for baseline setting and monitoring (Version 03) the leakage is determined as “the net change of anthropogenic emissions by sources and/or removals by sinks of GHGs which occurs outside the project boundary, and that can be measured and is directly attributable to the JI project”. In case the potential leakage is determined the project participants must undertake an assessment of the potential leakage of the proposed JI project and explain which sources of leakage are to be calculated, and which can be neglected.

Main sources of significant leakage as a result of the project implementation include emissions associated with the following processes that occur outside of the project boundaries:

- Coke production;
- Pellets production;
- Limestone production;
- Energy resources production (electricity, blast, compressed air).

These sources of leakage are included in the monitoring plan (Section D) and estimated in the PDD (Section E).

Other potential sources of leakages during the project implementation are negligible:

- Emissions that occur at the stage of production, processing and transportation of fuel and raw materials used in the manufacture of steel products by ChMK are excluded from consideration because the project implementation leads to a decrease in consumption of raw materials, fuel and energy as compared to the baseline scenario;
- Emissions that occur at the stage of production, processing and transportation of fuel to generate energy resources are excluded from consideration because they are negligible, as confirmed by the analysis of methodologies for projects aimed at generating electricity.[27]

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

Date of baseline setting: 23.04.2012

The baseline has been developed by:

CJSC "National Carbon Sequestration Foundation"

Contact person: Mr. Roman Kazakov, principal specialist

Tel.: +7 499 788 78 35 ext. 113

Fax: +7 499 788 78 35 ext. 107

E-mail: kazakovra@ncsf.ru

CJSC "National Carbon Sequestration Foundation" is not a project participant.

[27] Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 11), p. 11, http://cdm.unfccc.int/UserManagement/FileStorage/HGY3TLRFPQVM016WA4I7XCZD92KE5S

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

27.07.2003

The starting date of the project is determined as date of first contact signing for project equipment supply.[28]

C.2. Expected operational lifetime of the project:

15 years (180 months)

The expected operational lifetime of the project is determined as lifetime of the main projects equipment in accordance with Russian regulations.[29]

C.3. Length of the crediting period:

Length of the crediting period: 01/01/2008[30] – 31/12/2020 (13 years, 156 months), including:

- First commitment period: 01/01/2008 – 31/12/2012 (5 years, 60 months);
- Period after the first commitment period: 01/01/2013 – 31/12/2020 (8 years, 96 months).

[28] Contract #756/00186465/00055 dated on 27.07.2003 between “Conares Trading AG” and JSC “Mechel”.

[29] Russian Government Decree #1 dated on 01/01/2002 About fixed assets included in depreciation groups (edit. by Decrees of Russian Government # 415 on 09/07/2003, #476 on 08/08/2003, # 697 on 18/11/2006, #676 on 12/09/2008)

[30] The starting date of the crediting period is determined since 01/01/2009 after the date the first emission reductions in accordance with paragraph 19 Guidance on criteria for baseline setting and monitoring (Version 02).

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

The monitoring plan is elaborated using the following step-wise approach[31]:

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

Step 2. Application of the approach chosen.

The description of the above approach is provided below.

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

A JI specific approach is chosen for monitoring plan setting in accordance with paragraph 9 (a) of Guidance on criteria for baseline setting and monitoring (Version 03). The approved CDM baseline and monitoring methodologies and each elements are not used for monitoring.

The chosen JI specific approach is based on paragraph 30 of Guidance on criteria for baseline setting and monitoring (Version 03). The approach chosen includes the following procedures:

- The collection and archiving of all relevant data necessary for estimating or measuring anthropogenic emissions by sources of GHGs occurring within the project boundary during the crediting period;
- The collection and archiving of all relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary during the crediting period;
- The identification of all potential sources of, and the collection and archiving of data on increased anthropogenic emissions by sources of GHGs outside the project boundary that are significant and reasonably attributable to the project during the crediting period;
- The collection and archiving of information on environmental impacts, in accordance with procedures as required by the host Party;
- Quality assurance and control procedures for the monitoring process;
- Procedures for the periodic calculation of the reductions of anthropogenic emissions by sources by the proposed JI project, and for leakage effects.

The application of the above described approach is provided below and in the section D.1 - D.4.

[31] In accordance with Guidelines for users of the joint implementation project design documentation form (Version 04).

Step 2. Application of the approach chosen

Monitoring of GHG emission reductions is based on the emissions monitoring by the following scenarios:

Project scenario. Mainly production of continuous casted billets from the steel smelted in ChMK oxygen-converter plant.

The project scenario includes a complex of ChMK measures aimed at metallurgical production reconstruction by way of introduction of continuous casting and secondary metallurgy at the oxygen-converter plant (CCM-3, CCM-4, CCM-5, LF-2, LF-3, LF-4, vacuum vessel) and at the arc-furnace plant #6 (renewal of CCM-2, installation of LF-2 and vacuum vessel).Implementation of this scenario allows for increase in production of continuous casted billets from the steel made at the oxygen-converter plant. The main sintering, blast-furnace, steelmaking and rolling plants production facilities of ChMK have remained unchanged. The detailed characteristic of emission sources in the project scenario is provided in the table B.3-1 and B.3-2.

Baseline scenario. Mainly production of rolled billets from the steel smelted in ChMK oxygen-converter plant.

The baseline scenario is the continuation of the of the current situation: mainly production of rolled billets from the steel smelted at the oxygen-converter plant by casting it into molds and subsequent rolling of ingots at rolling plant #3 on mill 1250-3 / continuous billet mill and partly production of continuous cast steel billets on CCM-2 of arc-furnace plant #6. The main sintering, blast-furnace, steelmaking and rolling plants production facilities of ChMK have remained unchanged. The detailed characteristic of emission sources in the baseline scenario is provided in the table B.3-1 and B.3-2.

Approach for calculation of GHG emissions:

1. Calculation of CO_2 emissions in the project and baseline scenarios from sintering plant, blast-furnace plant, oxygen-converter plant, arc-furnace plant is provided based on calculation of carbon oxidation of raw materials and fuel determined as carbon balance between the material flows (steel scrap, pig iron, coke, natural gas, electrodes, limestone) and product flows (pig iron, steel). It is assumed that all carbon not fixed in the finished products is oxidized to CO_2. This approach is corresponding to the IPCC Guidelines.

2. Calculation of CO_2 emissions in the project and baseline scenarios from rolling plant #3 and CO_2 leakages from energy resources generation (electricity, blast, compressed air) is provided based on data of fuel (natural gas, coal) combustion and emission factor from fuel combustion. The oxidation factor of fuel is estimated equal 1 (or 100%) for conservative assumption of emissions. In calculation of CO_2 emissions are not included the emissions from blast-furnace gas and coke oven gas combustion for exclusion of double counting as these emissions are included in the emissions by pig iron and coke production. This approach is corresponding to the IPCC Guidelines.

3. Calculation of CO_2emissions from fuel combustion for electricity generation is provided based on data of electricity consumption from the grid and emission factor from electricity generation in the grid for the project consumed electricity.

4. Calculation of CO_2 leakages from coke, pellets and lime production is provided based on data of these raw materials consumption in the project and baseline scenarios and emission factors from their production outside the project boundaries. The approach for leakages estimation is corresponding to the IPCC Guidelines.

Parameters necessary for GHG calculation in accordance with the above approaches are as follows.

1. Parameters which are continuously monitored during the crediting period:

- pig iron, steel scrap, limestone, lime, electrodes, natural gas, electricity, oxygen consumption in oxygen-converter plant;
- steel production in oxygen-converter plant;
- pig iron, steel scrap, limestone, lime, electrodes, natural gas, electricity, oxygen consumption in arc-furnace plant #6;
- steel production in arc-furnace plant #6;
- coke, limestone, sinter, pellets, natural gas, blast, electricity, oxygen consumption in blast-furnace plant;
- pig iron production in blast-furnace plant;
- coke, limestone, lime, sinter, natural gas, electricity consumption in sintering plant;
- sinter production in sintering plant;
- natural gas, electricity, oxygen consumption in rolling plant #3;
- ingots rolling in rolling plant #3;
- natural gas, coal consumption in CHPP for energy resources production (electricity, blast, compressed air);
- electricity consumption from the grid;
- electricity consumption from the CHPP;
- electricity, blast, compressed air production in CHPP;
- electricity, compressed air consumption for oxygen production;
- oxygen distribution;
- ash, volatile matter, sulphur content in coke;
- conversion factor of natural gas consumption to standard fuel.

These parameters including the information on their recording and archiving are given in tables D.1.1.1, D.1.1.3 and D.1.3.1.

2. Parameters which are determined once and are taken as constants for the whole monitoring period. They are available at the stage of determination:

- carbon content in steel scrap;
- carbon content in steel;
- carbon content in pig iron;
- carbon content in electrodes;
- carbon content in limestone;
- default carbon content in natural gas;
- default CO_2 emission factor from natural gas combustion;
- default CO_2 emission factor from coal combustion;
- emission factor from natural gas combustion in tCO_2/ t of standard fuel;
- emission factor from coal combustion in tCO_2/ t of standard fuel;
- conversion factor of calorie into joule;
- conversion factor of standard fuel into calorie;
- CO_2 emission factor for electricity generation in the grid;
- CO_2 emission factor for pellets production;
- CO_2 emission factor for coke production;
- CO_2 emission factor for lime production;
- maximal continuous billets production from the oxygen-converter steel in the baseline scenario;
- specific oxygen consumption in oxygen-converter plant in the baseline scenario;
- specific electricity consumption in oxygen-converter plant in the baseline scenario;
- specific electrodes consumption in oxygen-converter plant in the baseline scenario;

- specific ingots consumption for billets production in the baseline scenario;
- specific natural gas consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario;
- specific electricity consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario;
- specific oxygen consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario.

The above parameters detailed information is provided in the Annex 3 “Monitoring plan”.

3. Parameters which are determined once and are taken as constants during monitoring but are not available at the stage of determination:

Absent.

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
ID-1 $FC_{i,BOFP,PJ,y}$	fuel i consumption in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	thousand m^3	m	Monthly	100%	Electronic and paper	Natural gas consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-2 $RMC_{j,BOFP,PJ,y}$	raw materials j consumption in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	t	m, c	Monthly	100%	Electronic and paper	Pig iron, scrap steel, limestone, consumption is measured. Electrodes consumption is calculated based on certificates. Responsible for recording – Head of plant.
ID-3 $P_{steel,BOFP,PJ,y}$	steel production in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-4 $FC_{i,EAFP,PJ,y}$	fuel i consumption in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	thousand m^3	m	Monthly	100%	Electronic and paper	Natural gas consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-5 $RMC_{j,EAFP,PJ,y}$	raw materials j consumption in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	t	m, c	Monthly	100%	Electronic and paper	Pig iron, scrap steel, limestone, consumption is measured. Electrodes consumption is calculated based on certificates. Responsible for recording – Head of plant.
ID-6 $P_{steel,EAFP,PJ,y}$	steel production in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	t	m, c	Monthly	100%	Electronic and paper	Billets production is measured. Ingots production is determined according to the internal procedures. Responsible for recording – Head of plant.
ID-7 $FC_{i,BFP,y}$	fuel i consumption in blast-furnace plant	Report of costs in blast-furnace plant	thousand m^3	m	Monthly	100%	Electronic and paper	Natural gas consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-8 $RMC_{j,BFP,y}$	raw materials j consumption in blast-furnace plant	Report of costs in blast-furnace plant	t	m	Monthly	100%	Electronic and paper	Coke, limestone, sinter consumption. Responsible for recording – Head of plant.
ID-9 $P_{iron,y}$	pig iron production in blast-furnace plant	Report of costs in blast-furnace plant	t	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of plant.
ID-10 $FC_{i,SP,y}$	fuel i consumption in sintering plant	Report of costs in sintering plant	thousand m^3	m	Monthly	100%	Electronic and paper	Natural gas consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-11 $RMC_{j,SP,y}$	raw materials j consumption in sintering plant	Report of costs in sintering plant	t	m	Monthly	100%	Electronic and paper	Coke, limestone consumption. Responsible for recording – Head of plant.
ID-12 $P_{sinter,y}$	sinter production in sintering plant	Report of costs in sintering plant	t	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of plant.
ID-13 $FC_{i,RP,y}$	fuel i consumption in rolling plant #3 on mill 1250-3/CBM	Report of costs in rolling plant #3	thousand m^3	m	Monthly	100%	Electronic and paper	Natural gas consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-14 $P_{ingots,y}$	ingots rolling in rolling plant #3 on mill 1250-3/CBM	Report of costs in rolling plant #3	t	c	Monthly	100%	Electronic and paper	Ingots consumption is determined based on certificates of melting. Responsible for recording – Head of plant.
ID-15 $P_{ingots,BOFP,PJ,y}$	ingots production in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-16 $P_{ingots,EAFP,PJ,y}$	ingots production in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-17.1 $A_{coke,y}$	ash content in coke	Reference of CJSC “Mechel Coke”	%	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-17.2 $V_{coke,y}$	volatile matter content in coke	Reference of CJSC "Mechel Coke"	%	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-17.3 $S_{coke,y}$	sulphur content in coke	Reference of CJSC "Mechel Coke"	%	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-18 $k_{NG,y}$	conversion factor of natural gas consumption to standard fuel	Reference of CJSC "Mechel Energo"	t of standard fuel / thousand m^3	c	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
$W_{C,RMj,y}$	carbon content in raw materials j	Reference data	tC / t	e	Determined ex ante	100%	Electronic	Carbon content in pig iron, steel, scrap steel, limestone, electrodes. Detailed information is provided in the Annex 3.
$EF_{NG,default}$	default CO_2 emission factor from natural gas combustion	Reference data	tCO_2/TJ	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.

$W_{C,NG,default}$	default carbon content in natural gas	Reference data	tC / TJ	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$k_{J/cal}$	conversion factor	Reference data	J / cal	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$k_{kcal/kg\ c.e.}$	conversion factor	Reference data	kcal / kg of standard fuel	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.

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

(1) $PE_y = PE_{BOFP,y} + PE_{EAFP,y} + PE_{BFP,y} + PE_{SP,y} + PE_{RP,y}$

PE_y - project emissions, tCO_2

$PE_{BOFP,y}$ - project emissions in oxygen-converter plant, tCO_2

$PE_{EAFP,y}$ - project emissions in arc-furnace plant #6, tCO_2

$PE_{BFP,y}$ - project emissions in blast-furnace plant, tCO_2

$PE_{SP,y}$ - project emissions in sintering plant, tCO_2

$PE_{RP,y}$ - project emissions in rolling plant #3, tCO_2

y - year

(1.1) $PE_{BOFP,y} = [FC_{i,BOFP,PJ,y} * W_{C,Fi,y} + \Sigma(RMC_{j,BOFP,PJ,y} * W_{C,RMj,y}) – P_{steel,BOFP,PJ,y} * W_{C,steel,y}] * 44/12$

$PE_{BOFP,y}$ - project emissions in oxygen-converter plant, tCO_2

$FC_{i,BOFP,PJ,y}$ - fuel i consumption in oxygen-converter plant in the project scenario, thousand m^3

$W_{C,Fi,y}$ - carbon content in fuel i, tC / thousand m^3
$RMC_{j,BOFP,PJ,y}$ - raw materials j consumption in oxygen-converter plant in the project scenario, t
$W_{C,RMj,y}$ - carbon content in raw materials j, tC / t
$P_{steel,BOFP,PJ,y}$ - steel production in oxygen-converter plant in the project scenario, t
$W_{C,steel,y}$ - carbon content in steel, tC / t
i - natural gas
j - pig iron, scrap steel, limestone, electrodes
y - year

(1.2) $PE_{EAFP,y} = [FC_{i,EAFP,PJ,y} * W_{C,Fi,y} + \Sigma(RMC_{j,EAFP,PJ,y} * W_{C,RMj,y}) - P_{steel,EAFP,PJ,y} * W_{C,steel,y}] * 44/12$
$PE_{EAFP,y}$ - project emissions in arc-furnace plant #6, tCO_2
$FC_{i,EAFP,PJ,y}$ - fuel i consumption in arc-furnace plant #6 in the project scenario, thousand m^3
$W_{C,Fi,y}$ - carbon content in fuel i, tC / thousand m^3
$RMC_{j,EAFP,PJ,y}$ - raw materials j consumption in arc-furnace plant #6 in the project scenario, t
$W_{C,RMj,y}$ - carbon content in raw materials j, tC / t
$P_{steel,EAFP,PJ,y}$ - steel production in arc-furnace plant #6 in the project scenario, t
$W_{C,steel,y}$ - carbon content in steel, tC / t
i - natural gas
j - pig iron, scrap steel, limestone, electrodes
y - year

(1.3) $PE_{BFP,y} = [P_{iron,PJ,y} * SFC_{i,BFP,PJ,y} * W_{C,Fi,y} + \Sigma(P_{iron,PJ,y} * SRMC_{j,BFP,PJ,y} * W_{C,RMj,y}) - P_{iron,PJ,y} * W_{C,iron,y}] * 44/12$

$PE_{BFP,y}$ - project emissions in blast-furnace plant, tCO_2

$P_{iron,PJ,y}$ - pig iron production in blast-furnace plant in the project scenario, t

$SFC_{i,BFP,PJ,y}$ - specific fuel i consumption in blast-furnace plant in the project scenario, thousand m^3/t

$W_{C,Fi,y}$ - carbon content in fuel i, tC / thousand m^3

$SRMC_{j,BFP,PJ,y}$ - specific raw materials j consumption in blast-furnace plant in the project scenario, t/t

$W_{C,RMj,y}$ - carbon content in raw materials j, tC / t

$W_{C,iron,y}$ - carbon content in pig iron, tC / t

i - natural gas

j - coke, limestone

y - year

(1.3.1) $P_{iron,PJ,y} = RMC_{iron,BOFP,PJ,y} + RMC_{iron,EAFP,PJ,y}$

$P_{iron,PJ,y}$ - pig iron production in blast-furnace plant in the project scenario, t

$RMC_{iron,BOFP,PJ,y}$ - pig iron consumption in oxygen-converter plant in the project scenario, t

$RMC_{iron,EAFP,PJ,y}$ - pig iron consumption in arc-furnace plant #6 in the project scenario, t

y - year

(1.3.2) $SFC_{i,BFP,PJ,y} = FC_{i,BFP,y} / P_{iron,y}$

$SFC_{i,BFP,PJ,y}$ - specific fuel i consumption in blast-furnace plant in the project scenario, thousand m^3/t

$FC_{i,BFP,y}$ - fuel i consumption in blast-furnace plant, thousand m^3

$P_{iron,y}$ - pig iron production in blast-furnace plant, t i - natural gas

y - year

(1.3.3) $SRMC_{j,BFP,PJ,y} = RMC_{j,BFP,y} / P_{iron,y}$

$SRMC_{j,BFP,PJ,y}$ - specific raw materials j consumption in blast-furnace plant in the project scenario, t/t

$RMC_{j,BFP,y}$ - raw materials j consumption in blast-furnace plant, t

$P_{iron,y}$ - pig iron production in blast-furnace plant, t

j - coke, limestone

y - year

(1.4) $PE_{SP,y} = [P_{sinter,PJ,y} * SFC_{i,SP,PJ,y} * W_{C,Fi,y} + \Sigma(P_{sinter,PJ,y} * SRMC_{j,SP,PJ,y} * W_{C,RMj,y})] * 44/12$

$PE_{SP,y}$ - project emissions in sintering plant, tCO_2

$P_{sinter,PJ,y}$ - sinter production in sintering plant in the project scenario, t

$SFC_{i,SP,PJ,y}$ - specific fuel i consumption in sintering plant in the project scenario, thousand m^3/t

$W_{C,Fi,y}$ - carbon content in fuel i, tC / thousand m^3

$SRMC_{j,SP,PJ,y}$ - specific raw materials j consumption in sintering plant in the project scenario, t/t

$W_{C,RMj,y}$ - carbon content in raw materials j, tC / t

i - natural gas

j - coke, limestone

y - year

(1.4.1) $P_{sinter,PJ,y} = (RMC_{sinter,BFP,y} / P_{iron,y}) * P_{iron,PJ,y}$

$P_{sinter,PJ,y}$ - sinter production in sintering plant in the project scenario, t

$RMC_{sinter,BFP,y}$ - sinter consumption in blast-furnace plant, t

$P_{iron,y}$ - pig iron production in blast-furnace plant, t

$P_{iron,PJ,y}$ - pig iron production in blast-furnace plant in the project scenario, t

y - year

(1.4.2) $SFC_{i,SP,PJ,y} = FC_{i,SP,y} / P_{sinter,y}$

$SFC_{i,SP,PJ,y}$ - specific fuel i consumption in sintering plant in the project scenario, thousand m^3/t

$FC_{i,SP,y}$ - fuel i consumption in sintering plant, thousand m^3

$P_{sinter,y}$ - sinter production in sintering plant, t

i - natural gas

y - year

(1.4.3) $SRMC_{j,SP,PJ,y} = RMC_{j,SP,y} / P_{sinter,y}$

$SRMC_{j,SP,PJ,y}$ - specific raw materials j consumption in sintering plant in the project scenario, t/t

$RMC_{j,SP,y}$ - raw materials j consumption in sintering plant, t

$P_{sinter,y}$ - sinter production in sintering plant, t

j - coke, limestone

y - year

(1.5) $PE_{RP,y} = FC_{i,RP,PJ,y} * EF_{Fi,y}$

$PE_{RP,y}$ - project emissions in rolling plant #3, tCO_2

$FC_{i,RP,PJ,y}$ - fuel i consumption in rolling plant #3 in the project scenario, thousand m^3

$EF_{Fi,y}$ - CO_2 emission factor from fuel i combustion, tCO_2 / thousand m^3

i - natural gas

y - year

(1.5.1) $FC_{i,RP,PJ,y} = (FC_{i,RP,y} / P_{ingots,y}) * (P_{ingots,BOFP,PJ,y} + P_{ingots,EAFP,PJ,y})$

$FC_{i,RP,PJ,y}$ - fuel i consumption in rolling plant #3 in the project scenario, thousand m^3

$FC_{i,RP,y}$ - fuel i consumption in rolling plant #3 on mill 1250-3/CBM, thousand m^3

$P_{ingots,y}$ - ingots rolling in rolling plant #3 on mill 1250-3/CBM, t

$P_{ingots,BOFP,PJ,y}$ - ingots production in oxygen-converter plant in the project scenario, t

$P_{ingots,EAFP,PJ,y}$ - ingots production in arc-furnace plant #6 in the project scenario, t

i - natural gas

y - year

(1.6) $W_{C,coke,y} = [100 – (A_{coke,y} + V_{coke,y} + S_{coke,y})] / 100$

$W_{C,coke,y}$ - carbon content in coke, tC/t

$A_{coke,y}$ - ash content in coke, %

$V_{coke,y}$ - volatile matter content in coke, %

$S_{coke,y}$ - sulphur content in coke, %

y - year

(1.7) $EF_{NG,y} = EF_{NG,default} * k_{J/cal} * k_{kcal/kg\ c.e.} * k_{NG,y} * 10^{-6}$

$EF_{NG,y}$ - CO_2 emission factor from natural gas combustion, tCO_2/thousand m^3

$EF_{NG,default}$ - default CO_2 emission factor from natural gas combustion, tCO_2/TJ

$k_{J/cal}$ - conversion factor, J/cal

$k_{kcal/kg\ c.e.}$ - conversion factor, kcal / kg of standard fuel

$k_{NG,y}$ - conversion factor of natural gas consumption to standard fuel, t of standard fuel / thousand m^3

y - year

(1.8) $W_{C,NG,y} = W_{C,NG,default} * k_{J/cal} * k_{kcal/kg\ c.e.} * k_{NG,y} * 10^{-6}$

$W_{C,NG,y}$ - carbon content in natural gas, tC/thousand m^3

$W_{C,NG,default}$ - default carbon content in natural gas, tC/TJ

$k_{J/cal}$ - conversion factor, J/cal

$k_{kcal/kg\ c.e.}$ - conversion factor, kcal / kg of standard fuel

$k_{NG,y}$ - conversion factor of natural gas consumption to standard fuel, t of standard fuel / thousand m^3

y - year

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
ID-2 $RMC_{j,BOFP,PJ,y}$	raw materials j consumption in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	t	m, c	Monthly	100%	Electronic and paper	Pig iron, scrap steel, limestone, consumption is measured. Electrodes consumption is calculated based on certificates. Responsible for recording – Head of plant.
ID-3 $P_{steel,BOFP,PJ,y}$	steel production in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-4 $FC_{i,EAFP,PJ,y}$	fuel i consumption in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	thousand m^3	m	Monthly	100%	Electronic and paper	Natural gas consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-5 $RMC_{j,EAFP,PJ,y}$	raw materials j consumption in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	t	m, c	Monthly	100%	Electronic and paper	Pig iron, scrap steel, limestone, consumption is measured. Electrodes consumption is calculated based on certificates. Responsible for recording – Head of plant.
ID-6 $P_{steel,EAFP,PJ,y}$	steel production in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	t	m, c	Monthly	100%	Electronic and paper	Billets production is measured. Ingots production is determined according to the internal procedures. Responsible for recording – Head of plant.
ID-7 $FC_{i,BFP,y}$	fuel i consumption in blast-furnace plant	Report of costs in blast-furnace plant	thousand m^3	m	Monthly	100%	Electronic and paper	Natural gas consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-8 $RMC_{j,BFP,y}$	raw materials j consumption in blast-furnace plant	Report of costs in blast-furnace plant	t	m	Monthly	100%	Electronic and paper	Coke, limestone, sinter consumption. Responsible for recording – Head of plant.
ID-9 $P_{iron,y}$	pig iron production in blast-furnace plant	Report of costs in blast-furnace plant	t	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of plant.
ID-10 $FC_{i,SP,y}$	fuel i consumption in sintering plant	Report of costs in sintering plant	thousand m^3	m	Monthly	100%	Electronic and paper	Natural gas consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-11 $RMC_{j,SP,y}$	raw materials j consumption in sintering plant	Report of costs in sintering plant	t	m	Monthly	100%	Electronic and paper	Coke, limestone consumption. Responsible for recording – Head of plant.
ID-12 $P_{sinter,y}$	sinter production in sintering plant	Report of costs in sintering plant	t	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of plant.
ID-15 $P_{ingots,BOFP,PJ,y}$	ingots production in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.

ID-16 $P_{ingots,EAFP,PJ,y}$	ingots production in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-17.1 $A_{coke,y}$	ash content in coke	Reference of CJSC "Mechel Coke"	%	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-17.2 $V_{coke,y}$	volatile matter content in coke	Reference of CJSC "Mechel Coke"	%	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-17.3 $S_{coke,y}$	sulphur content in coke	Reference of CJSC "Mechel Coke"	%	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-18 $k_{NG,y}$	conversion factor of natural gas consumption to standard fuel	Reference of CJSC "Mechel Energo"	t of standard fuel / thousand m^3	c	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-19 $P_{CCM-1,BOFP,PJ,y}$	billets production on CCM-1 from oxygen-converter steel in the project scenario	Report of costs in arc-furnace plant #6	t	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of plant.
ID-20 $P_{CCM-2,BOFP,PJ,y}$	billets production on CCM-2 from oxygen-converter steel in the project scenario	Report of costs in arc-furnace plant #6	t	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of plant.
ID-21 $P_{CCM-3,BOFP,PJ,y}$	billets production on CCM-3 from oxygen-converter steel in the project scenario	Report of costs in oxygen-converter plant	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-22 $P_{CCM-4,BOFP,PJ,y}$	billets production on CCM-4 from oxygen-converter steel in the project scenario	Report of costs in oxygen-converter plant	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-23 $P_{CCM-5,BOFP,PJ,y}$	billets production on CCM-5 from oxygen-converter steel in the project scenario	Report of costs in oxygen-converter plant	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.

$SFC_{i,BOFP,BL,y}$	specific fuel i consumption in oxygen-converter plant in the baseline scenario	Calculated	thousand m^3 / t	c	Determined ex ante	100%	Electronic	Natural gas consumption. Detailed information is provided in the Annex 3.
$SRMC_{j,BOFP,BL,y}$	specific raw materials j consumption in oxygen-converter plant in the baseline scenario	Calculated	t / t	c	Determined ex ante	100%	Electronic	Electrodes consumption. Detailed information is provided in the Annex 3.
$P_{billets,BOFP,BL,max}$	maximal continuous billets production from the oxygen-converter steel in the baseline scenario	Estimated	t	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$SC_{steel/billet,BL}$	specific ingots consumption for billets production in the baseline scenario	Calculated	t / t	c	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$SFC_{i,RP,BL,y}$	specific fuel i consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario	Calculated	thousand m^3 / t	c	Determined ex ante	100%	Electronic	Natural gas consumption. Detailed information is provided in the Annex 3.

$W_{C,RMj,y}$	carbon content in raw materials j	Reference data	tC / t	e	Determined ex ante	100%	Electronic	Carbon content in pig iron, steel, scrap steel, limestone, electrodes. Detailed information is provided in the Annex 3.
$EF_{NG,default}$	default CO_2 emission factor from natural gas combustion	Reference data	tCO_2/TJ	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$W_{C,NG,default}$	default carbon content in natural gas	Reference data	tC / TJ	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$k_{J/cal}$	conversion factor	Reference data	J / cal	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$k_{kcal/kg\ c.e.}$	conversion factor	Reference data	kcal / kg of standard fuel	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.

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

(2) $BE_y = BE_{BOFP,y} + BE_{EAFP,y} + BE_{BFP,y} + BE_{SP,y} + BE_{RP,y}$

BE_y - baseline emissions, tCO_2

$BE_{BOFP,y}$ - baseline emissions in oxygen-converter plant, tCO_2

$BE_{EAFP,y}$ - baseline emissions in arc-furnace plant #6, tCO_2

$BE_{BFP,y}$ - baseline emissions in blast-furnace plant, tCO_2

$BE_{SP,y}$ - baseline emissions in sintering plant, tCO_2

$BE_{RP,y}$ - baseline emissions in rolling plant #3, tCO_2

y - year

(2.1) $BE_{BOFP,y} = [P_{steel,BOFP,BL,y} * SFC_{i,BOFP,BL,y} * W_{C,Fi,y} + \Sigma(P_{steel,BOFP,BL,y} * SRMC_{j,BOFP,BL,y} * W_{C,RMj,y}) - P_{steel,BOFP,BL,y} * W_{C,steel,y}] * 44/12$

$BE_{BOFP,y}$ - baseline emissions in oxygen-converter plant, tCO_2

$P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t

$SFC_{i,BOFP,BL,y}$ - specific fuel i consumption in oxygen-converter plant in the baseline scenario, thousand m^3 / t

$W_{C,Fi,y}$ - carbon content in fuel i, tC / thousand m^3

$SRMC_{j,BOFP,BL,y}$ - specific raw materials j consumption in oxygen-converter plant in the baseline scenario, t / t

$W_{C,RMj}$ - carbon content in raw materials j, tC / t

$W_{C,steel}$ - carbon content in steel, tC / t

i - natural gas

j - pig iron, scrap steel, limestone, electrodes

y - year

(2.1.1) $P_{steel,BOFP,BL,y} = P_{ingots,BOFP,BL,y} + P_{billets,BOFP,BL,max}$

$P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t

$P_{ingots,BOFP,BL,y}$ - ingots production in oxygen-converter plant in the baseline scenario, t

$P_{billets,BOFP,BL,max}$ - maximal continuous billets production from the oxygen-converter steel in the baseline scenario, t

y - year

(2.1.2) $P_{ingots,BOFP,BL,y} = P_{ingots,BOFP,PJ,y} + (\Sigma(P_{CCM-i,BOFP,PJ,y}) - P_{billets,BOFP,BL,max}) * SC_{steel/billet,BL}$

$P_{ingots,BOFP,BL,y}$ - ingots production in oxygen-converter plant in the baseline scenario, t

$P_{ingots,BOFP,PJ,y}$ - ingots production in oxygen-converter plant in the project scenario, t

$P_{CCM-i,BOFP,PJ,y}$ - billets production on CCM-i from oxygen-converter steel in the project scenario, t

$P_{billets,BOFP,BL,max}$ - maximal continuous billets production from the oxygen-converter steel in the baseline scenario, t

$SC_{steel/billet,BL}$ - specific ingots consumption for billets production in the baseline scenario, t / t

CCM-i - CCM-1, CCM-2, CCM-3, CCM-4, CCM-5

y - year

(2.1.3) $SRMC_{j,BOFP,BL,y} = RMC_{j,BOFP,PJ,y} / P_{steel,BOFP,PJ,y}$

$SRMC_{j,BOFP,BL,y}$ - specific raw materials j consumption in oxygen-converter plant in the baseline scenario, t / t

$RMC_{j,BOFP,PJ,y}$ - raw materials j consumption in oxygen-converter plant in the project scenario, t

$P_{steel,BOFP,PJ,y}$ - steel production in oxygen-converter plant in the project scenario, t

j - pig iron, scrap steel, limestone

y - year

(2.2) $BE_{EAFP,y} = [P_{steel,EAFP,BL,y} * SFC_{i,EAFP,BL,y} * W_{C,Fi,y} + \Sigma(P_{steel,EAFP,BL,y} * SRMC_{j,EAFP,BL,y} * W_{C,RMj,y}) – P_{steel,EAFP,BL,y} * W_{C,steel,y}] * 44/12$

$BE_{EAFP,y}$ - baseline emissions in arc-furnace plant #6, tCO_2

$P_{steel,EAFP,BL,y}$ - steel production in arc-furnace plant #6 in the baseline scenario, t

$SFC_{i,EAFP,BL,y}$ - specific fuel i consumption in arc-furnace plant #6 in the baseline scenario, thousand m^3 / t

$W_{C,Fi,y}$ - carbon content in fuel i, tC / thousand m^3

$SRMC_{j,EAFP,BL,y}$ - specific raw materials j consumption in arc-furnace plant #6 in the baseline scenario, t / t

$W_{C,RMj}$ - carbon content in raw materials j, tC / t

$W_{C,steel}$ - carbon content in steel, tC / t

i - natural gas

j - pig iron, scrap steel, limestone, electrodes

y - year

(2.2.1) $P_{steel,EAFP,BL,y} = P_{steel,EAFP,PJ,y}$

$P_{steel,EAFP,BL,y}$ - steel production in arc-furnace plant #6 in the baseline scenario, t

$P_{steel,EAFP,PJ,y}$ - steel production in arc-furnace plant #6 in the project scenario, t

y - year

(2.2.2) $SFC_{i,EAFP,BL,y} = FC_{i,EAFP,PJ,y} / P_{steel,EAFP,PJ,y}$

$SFC_{i,EAFP,BL,y}$ - specific fuel i consumption in arc-furnace plant #6 in the baseline scenario, thousand m^3 / t

$FC_{i,EAFP,PJ,y}$ - fuel i consumption in arc-furnace plant #6 in the project scenario, thousand m^3

$P_{steel,EAFP,PJ,y}$ - steel production in arc-furnace plant #6 in the project scenario, t

i - natural gas

y - year

(2.2.3) $SRMC_{j,EAFP,BL,y} = RMC_{j,EAFP,PJ,y} / P_{steel,EAFP,PJ,y}$

$SRMC_{j,EAFP,BL,y}$ - specific raw materials j consumption in arc-furnace plant #6 in the baseline scenario, t / t

$RMC_{j,EAFP,PJ,y}$ - raw materials j consumption in arc-furnace plant #6 in the project scenario, t

$P_{steel,EAFP,PJ,y}$ - steel production in arc-furnace plant #6 in the project scenario, t

j - pig iron, scrap steel, limestone, electrodes

y - year

(2.3) $BE_{BFP,y} = [P_{iron,BL,y} * SFC_{i,BFP,BL,y} * W_{C,Fi,y} + \Sigma(P_{iron,BL,y} * SRMC_{j,BFP,BL,y} * W_{C,RMj,y}) – P_{iron,BL,y} * W_{C,iron,y}] * 44/12$

$BE_{BFP,y}$ - baseline emissions in blast-furnace plant, tCO_2

$P_{iron,BL,y}$ - pig iron production in blast-furnace plant in the baseline scenario, t

$SFC_{i,BFP,BL,y}$ - specific fuel i consumption in blast-furnace plant in the baseline scenario, thousand m^3 / t

$W_{C,Fi,y}$ - carbon content in fuel i, tC / thousand m^3

$SRMC_{j,BFP,BL,y}$ - specific raw materials j consumption in blast-furnace plant in the baseline scenario, t/t

$W_{C,RMj,y}$ - carbon content in raw materials j, tC / t

$W_{C,iron,y}$ - carbon content in pig iron, tC / t

i - natural gas
j - coke, limestone

y - year

(2.3.1) $P_{iron,BL,y} = (P_{steel,BOFP,BL,y} * SRMC_{iron,BOFP,BL,y}) + (P_{steel,EAFP,BL,y} * SRMC_{iron,EAFP,BL,y})$

$P_{iron,BL,y}$ - pig iron production in blast-furnace plant in the baseline scenario, t

$P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t

$SRMC_{iron,BOFP,BL,y}$ - specific pig iron consumption in oxygen-converter plant in the baseline scenario, t / t
$P_{steel,EAFP,BL,y}$ - steel production in arc-furnace plant #6 in the baseline scenario, t
$SRMC_{iron,EAFP,BL,y}$ - specific pig iron consumption in arc-furnace plant #6 in the baseline scenario, t / t
y - year

(2.3.2) $SFC_{i,BFP,BL,y} = FC_{i,BFP,y} / P_{iron,y}$

$SFC_{i,BFP,BL,y}$ - specific fuel i consumption in blast-furnace plant in the baseline scenario, thousand m^3 / t
$FC_{i,BFP,y}$ - fuel i consumption in blast-furnace plant, thousand m^3
$P_{iron,y}$ - pig iron production in blast-furnace plant, t
i - natural gas
y - year

(2.3.3) $SRMC_{j,BFP,BL,y} = RMC_{j,BFP,y} / P_{iron,y}$

$SRMC_{j,BFP,BL,y}$ - specific raw materials j consumption in blast-furnace plant in the baseline scenario, t/t
$RMC_{j,BFP,y}$ - raw materials j consumption in blast-furnace plant, t
$P_{iron,y}$ - pig iron production in blast-furnace plant, t
j - coke, limestone
y - year

(2.4) $BE_{SP,y} = [P_{sinter,BL,y} * SFC_{i,SP,BL,y} * W_{C,Fi,y} + \Sigma(P_{sinter,BL,y} * SRMC_{j,SP,BL,y} * W_{C,RMj,y})] * 44/12$

$BE_{SP,y}$ - baseline emissions in sintering plant, tCO_2
$P_{sinter,BL,y}$ - sinter production in sintering plant in the baseline scenario, t
$SFC_{i,SP,BL,y}$ - specific fuel i consumption in sintering plant in the baseline scenario, thousand m^3 / t

$W_{C,Fi,y}$ - carbon content in fuel i, tC / thousand m^3

$SRMC_{j,SP,BL,y}$ - specific raw materials j consumption in sintering plant in the baseline scenario, t/t

$W_{C,RMj,y}$ - carbon content in raw materials j, tC / t

i - natural gas

j - coke, limestone

y - year

(2.4.1) $P_{sinter,BL,y} = (RMC_{sinter,BFP,y} / P_{iron,y}) * P_{iron,BL,y}$

$P_{sinter,BL,y}$ - sinter production in sintering plant in the baseline scenario, t

$RMC_{sinter,BFP,y}$ - sinter consumption in blast-furnace plant, t

$P_{iron,y}$ - pig iron production in blast-furnace plant, t

$P_{iron,BL,y}$ - pig iron production in blast-furnace plant in the baseline scenario, t

y - year

(2.4.2) $SFC_{i,SP,BL,y} = FC_{i,SP,y} / P_{sinter,y}$

$SFC_{i,SP,BL,y}$ - specific fuel i consumption in sintering plant in the baseline scenario, thousand m^3 / t

$FC_{i,SP,y}$ - fuel i consumption in sintering plant, thousand m^3

$P_{sinter,y}$ - sinter production in sintering plant, t

i - natural gas

y - year

(2.4.3) $SRMC_{j,SP,BL,y} = RMC_{j,SP,y} / P_{sinter,y}$

$SRMC_{j,SP,BL,y}$ - specific raw materials j consumption in sintering plant in the baseline scenario, t/t

$RMC_{j,SP,y}$ - raw materials j consumption in sintering plant, t

$P_{sinter,y}$ - sinter production in sintering plant, t

j - coke, limestone

y - year

(2.5) $BE_{RP,y} = FC_{i,RP,BL,y} * EF_{Fi,y}$

$BE_{RP,y}$ - baseline emissions in rolling plant #3, tCO_2

$FC_{i,RP,BL,y}$ - fuel i consumption in rolling plant #3 in the baseline scenario, thousand m^3

$EF_{Fi,y}$ - CO_2 emission factor from fuel i combustion, tCO_2 / thousand m^3

y - year

(2.5.1) $FC_{i,RP,BL,y} = SFC_{i,RP,BL,y} * (P_{ingots,BOFP,BLy} + P_{ingots,EAFP,BL,y})$

$FC_{i,RP,BL,y}$ - fuel i consumption in rolling plant #3 in the baseline scenario, thousand m^3

$SFC_{i,RP,BL,y}$ - specific fuel i consumption in rolling plant #3 in the baseline scenario, thousand m^3 / t

$P_{ingots,BOFP,BL,y}$ - ingots production in oxygen-converter plant in the baseline scenario, t

$P_{ingots,EAFP,BL,y}$ - ingots production in arc-furnace plant #6 in the baseline scenario, t

i - natural gas

y - year

(2.5.2)	$P_{ingots,EAFP,BL,y} = P_{ingots,EAFP,PJ,y}$
$P_{ingots,EAFP,BL,y}$	- ingots production in arc-furnace plant #6 in the baseline scenario, t
$P_{ingots,EAFP,PJ,y}$	- ingots production in arc-furnace plant #6 in the project scenario, t
y	- year

(2.6)	$W_{C,coke,y} = [100 – (A_{coke,y} + V_{coke,y} + S_{coke,y})] / 100$
$W_{C,coke,y}$	- carbon content in coke, tC/t
$A_{coke,y}$	- ash content in coke, %
$V_{coke,y}$	- volatile matter content in coke, %
$S_{coke,y}$	- sulphur content in coke, %
y	- year

(2.7)	$EF_{NG,y} = EF_{NG,default} * k_{J/cal} * k_{kcal/kg\ c.e.} * k_{NG,y} * 10^{-6}$
$EF_{NG,y}$	- CO_2 emission factor from natural gas combustion, tCO_2/thousand m^3
$EF_{NG,default}$	- default CO_2 emission factor from natural gas combustion, tCO_2/TJ
$k_{J/cal}$	- conversion factor, J/cal
$k_{kcal/kg\ c.e.}$	- conversion factor, kcal / kg of standard fuel
$k_{NG,y}$	- conversion factor of natural gas consumption to standard fuel, t of standard fuel / thousand m^3
y	- year

(2.8) $W_{C,NG,y} = W_{C,NG,default} * k_{J/cal} * k_{kcal/kg\ c.e.} * k_{NG,y} * 10^{-6}$

$W_{C,NG,y}$ - carbon content in natural gas, tC/thousand m^3

$W_{C,NG,default}$ - default carbon content in natural gas, tC/TJ

$k_{J/cal}$ - conversion factor, J/cal

$k_{kcal/kg\ c.e.}$ - conversion factor, kcal / kg of standard fuel

$k_{NG,y}$ - conversion factor of natural gas consumption to standard fuel, t of standard fuel / thousand m^3

y - year

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

Not applicable

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
ID-2 $RMC_{j,BOFP,PJ,y}$	raw materials j consumption in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	t	m	Monthly	100%	Electronic and paper	Lime consumption. Responsible for recording – Head of plant.
ID-3 $P_{steel,BOFP,PJ,y}$	steel production in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-5 $RMC_{j,EAFP,PJ,y}$	raw materials j consumption in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	t	m	Monthly	100%	Electronic and paper	Lime consumption. Responsible for recording – Head of plant.

ID-6 $P_{steel,EAFP,PJ,y}$	steel production in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	t	m, c	Monthly	100%	Electronic and paper	Billets production is measured. Ingots production is determined according to the internal procedures. Responsible for recording – Head of plant.
ID-7 $FC_{i,BFP,y}$	fuel i consumption in blast-furnace plant	Report of costs in blast-furnace plant	thousand m^3	m	Monthly	100%	Electronic and paper	Natural gas consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-8 $RMC_{j,BFP,y}$	raw materials j consumption in blast-furnace plant	Report of costs in blast-furnace plant	t	m	Monthly	100%	Electronic and paper	Pellets consumption. Responsible for recording – Head of plant.
ID-9 $P_{iron,y}$	pig iron production in blast-furnace plant	Report of costs in blast-furnace plant	t	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of plant.
ID-11 $RMC_{j,SP,y}$	raw materials j consumption in sintering plant	Report of costs in sintering plant	t	m	Monthly	100%	Electronic and paper	Lime consumption. Responsible for recording – Head of plant.

ID-12 $P_{sinter,y}$	sinter production in sintering plant	Report of costs in sintering plant	t	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of plant.
ID-14 $P_{ingots,y}$	ingots rolling in rolling plant #3 on mill 1250-3/CBM	Report of costs in rolling plant #3	t	c	Monthly	100%	Electronic and paper	Ingots consumption is determined based on certificates of melting. Responsible for recording – Head of plant.
ID-15 $P_{ingots,BOFP,PJ,y}$	ingots production in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-16 $P_{ingots,EAFP,PJ,y}$	ingots production in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	t	c	Monthly	100%	Electronic and paper	Determined according to the internal procedures. Responsible for recording – Head of plant.
ID-24 $FC_{CHPP,y}$	fuel consumption in CHPP	Reference of CJSC “Mechel Energo”	t of standard fuel	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-25 $FC_{i,CHPP,y}$	fuel i consumption in CHPP	Reference of CJSC "Mechel Energo"	t of standard fuel	m	Yearly	100%	Electronic and paper	Natural gas and coal consumption. Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-26 $FC_{ELEC,y}$	fuel consumption for electricity production	Reference of CJSC "Mechel Energo"	t of standard fuel	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-27 $FC_{blast,y}$	fuel consumption for blast production	Reference of CJSC "Mechel Energo"	t of standard fuel	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-28 $FC_{air,y}$	fuel consumption for compressed air production	Reference of CJSC "Mechel Energo"	t of standard fuel	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-29 $EC_{CHPP,y}$	electricity consumption from CHPP	Reference of CJSC "Mechel Energo"	MWh	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of Laboratory of regimes and electricity use.
ID-30 $EC_{GRID,y}$	electricity consumption from the grid	Reference of CJSC "Mechel Energo"	MWh	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of Laboratory of regimes and electricity use.
ID-31 $P_{ELEC,CHPP,y}$	electricity production in CHPP	Reference of CJSC "Mechel Energo"	MWh	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-32 $C_{blast,BFP,y}$	blast consumption in blast-furnace plant	Report of costs in blast-furnace plant	thousand m^3	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of plant.
ID-33 $P_{blast,y}$	blast production in CHPP	Reference of CJSC "Mechel Energo"	thousand m^3	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-34 $AC_{OP,y}$	compressed air consumption for oxygen production	Report of costs in oxygen-converter plant	thousand m^3	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-35 $P_{air,y}$	blast production in CHPP	Reference of CJSC “Mechel Energo”	thousand m^3	m	Yearly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-36 $EC_{BOFP,PJ,y}$	electricity consumption in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	MWh	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of Laboratory of regimes and electricity use.
ID-37 $EC_{EAFP,PJ,y}$	electricity consumption in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	MWh	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of Laboratory of regimes and electricity use.
ID-38 $EC_{BFP,y}$	electricity consumption in blast-furnace	Report of costs in blast-furnace plant	MWh	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of Laboratory of regimes and electricity use.

ID-39 $EC_{SP,y}$	electricity consumption in sintering plant	Report of costs in sintering plant	MWh	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of Laboratory of regimes and electricity use.
ID-40 $EC_{RP,y}$	electricity consumption in rolling plant #3 on mill 1250-3 / CBM	Report of costs in rolling plant #3	MWh	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of Laboratory of regimes and electricity use.
ID-41 $EC_{OP,y}$	electricity consumption in oxygen-compressor plant	Report of costs in oxygen-compressor plant	MWh	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of Laboratory of regimes and electricity use.
ID-42 $OC_{BOFP,PJ,y}$	oxygen consumption in oxygen-converter plant in the project scenario	Report of costs in oxygen-converter plant	thousand m^3	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-43 $OC_{EAFP,PJ,y}$	oxygen consumption in arc-furnace plant #6 in the project scenario	Report of costs in arc-furnace plant #6	thousand m^3	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.

ID-44 $OC_{BFP,y}$	oxygen consumption in blast-furnace plant	Report of costs in blast-furnace plant	thousand m^3	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-45 $OC_{RP,y}$	oxygen consumption in rolling plant #3 on mill 1250-3 / CBM	Report of costs in rolling plant #3	thousand m^3	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
ID-46 OD_y	oxygen distribution	Report of costs in oxygen-converter plant	thousand m^3	m	Monthly	100%	Electronic and paper	Responsible for recording – Head of bureau of energy consumption, planning and analysis.
$EF_{CO2,pellet,y}$	emission factor for pellets production	Reference data	tCO_2/t	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$EF_{CO2,coke,y}$	emission factor for coke production	Reference data	tCO_2/t	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$EF_{CO2,lime,y}$	emission factor for lime production	Reference data	tCO_2/t	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.

$EF_{CO2,Fi,y}$	emission factor from fuel i combustion	Reference data	tCO_2 / t of standard fuel	e	Determined ex ante	100%	Electronic	Emission factor from natural gas and coal combustion. Detailed information is provided in the Annex 3.
$SEC_{BOFP,BL}$	specific electricity consumption in oxygen-converter plant in the baseline scenario	Reference data	MWh / t	c	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$SEC_{RP,BL}$	specific electricity consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario	Reference data	MWh / t	c	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$SOC_{RP,BL}$	specific oxygen consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario	Reference data	thousand m^3 / t	c	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.
$EF_{CO2,ELEC,GRID,y}$	CO_2 emission factor for electricity production in the grid	Reference data	tCO_2 / MWh	e	Determined ex ante	100%	Electronic	Detailed information is provided in the Annex 3.

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

(3) $LE_y = LE_{pellet,y} + LE_{coke,y} + LE_{lime,y} + LE_{blast,y} + LE_{elec,y} + LE_{air,y}$

LE_y - leakages, tCO_2

$LE_{pellet,y}$ - leakages from pellets production, tCO_2

$LE_{coke,y}$ - leakages from coke production, tCO_2

$LE_{lime,y}$ - leakages from lime production, tCO_2

$LE_{blast,y}$ - leakages from blast production, tCO_2

$LE_{elec,y}$ - leakages from electricity production, tCO_2

$LE_{air,y}$ - leakages from compressed air production, tCO_2

y - year

(3.1) $LE_{pellet,y} = (P_{iron,PJ,y} – P_{iron,BL,y}) * SRMC_{j,BFP,y} * EF_{CO2,pellet,y}$

$LE_{pellet,y}$ - leakages from pellets production, tCO_2

$P_{iron,PJ,y}$ - pig iron production in blast-furnace plant in the project scenario, t

$P_{iron,BL,y}$ - pig iron production in blast-furnace plant in the baseline scenario, t

$SRMC_{j,BFP,y}$ - specific raw materials j consumption in blast-furnace plant, t /t

$EF_{CO2,pellet,y}$ - CO_2 emission factor for pellets production, tCO_2/t

j - pellets

y - year

Calculation of pig iron production in the project scenario ($P_{iron,PJ,y}$) is provided by formula (1.3.1), in the baseline scenario ($P_{iron,BL,y}$) – by formula (2.3.1).

(3.1.1) $SRMC_{j,BFP,y} = RMC_{j,BFP,y} / P_{iron,y}$

$SRMC_{j,BFP,y}$ - specific raw materials j consumption in blast-furnace plant, t /t

$RMC_{j,BFP,y}$ - raw materials j consumption in blast-furnace plant, t

$P_{iron,y}$ - pig iron production in blast-furnace plant, t

j - pellets

y - year

(3.2) $LE_{coke,y} = [(P_{iron,PJ,y} * SRMC_{j,BFP,PJ,y} – P_{iron,BL,y} * SRMC_{j,BFP,BL,y}) + (P_{sinter,PJ,y} * SRMC_{j,SP,PJ,y} – P_{sinter,BL,y} * SRMC_{j,SP,BL,y}] * EF_{CO2,coke,y}$

$LE_{coke,y}$ - leakages from coke production, tCO_2

$P_{iron,PJ,y}$ - pig iron production in blast-furnace plant in the project scenario, t

$SRMC_{j,BFP,PJ,y}$ - specific raw materials j consumption in blast-furnace plant in the project scenario, t /t

$P_{iron,BL,y}$ - pig iron production in blast-furnace plant in the baseline scenario, t

$SRMC_{j,BFP,BL,y}$ - specific raw materials j consumption in blast-furnace plant in the baseline scenario, t /t

$P_{sinter,PJ,y}$ - sinter production in sintering plant in the project scenario, t

$SRMC_{j,SP,PJ,y}$ - specific raw materials j consumption in sintering plant in the project scenario, t /t

$P_{sinter,BL,y}$ - sinter production in sintering plant in the baseline scenario, t

$SRMC_{j,SP,BL,y}$ - specific raw materials j consumption in sintering plant in the project scenario, t /t

$EF_{CO2,coke,y}$ - CO_2 emission factor for coke production, tCO_2/t

j - coke

y - year

Calculation of pig iron production in the project scenario ($P_{iron,PJ,y}$) is provided by formula (1.3.1), in the baseline scenario ($P_{iron,BL,y}$) – by formula (2.3.1). Calculation of sinter production in sintering plant in the project scenario ($P_{sinter,PJ,y}$) is provided by formula (1.4.1), in the baseline scenario ($P_{sinter,BL,y}$) – by formula (2.4.1). Calculation of specific coke consumption in blast-furnace plant in the project scenario ($SRMC_{coke,BFP,PJ,y}$) is provided by formula (1.3.3), in the baseline scenario ($SRMC_{coke,BFP,BL,y}$) – by formula (2.3.3). Calculation of specific coke consumption in sintering plant in the project scenario ($SRMC_{coke,BFP,PJ,y}$) is provided by formula (1.4.3), in the baseline scenario ($SRMC_{coke,BFP,PJ,y}$) – by formula (2.4.3).

(3.3) $LE_{lime,y} = [(P_{sinter,PJ,y} – P_{sinter,BL,y}) * SRMC_{j,SP,y} + (P_{steel,BOFP,PJ,y} – P_{steel,BOFP,BL,y}) * SRMC_{j,BOF,y} + (P_{steel,EAFP,PJ,y} – P_{steel,EAFP,BL,y}) * SRMC_{j,EAFP,y}] * EF_{CO2,lime,y}$

$LE_{lime,y}$ - leakages from lime production, tCO_2

$P_{sinter,PJ,y}$ - sinter production in sintering plant in the project scenario, t

$P_{sinter,BL,y}$ - sinter production in sintering plant in the baseline scenario, t

$SRMC_{j,SP,y}$ - specific raw materials j consumption in sintering plant, t /t

$P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t

$P_{steel,BOFP,PJ,y}$ - steel production in oxygen-converter plant in the project scenario, t

$SRMC_{j,BOFP,y}$ - specific raw materials j consumption in oxygen-converter plant, t /t

$P_{steel,EAFP,BL,y}$ - steel production in arc-furnace plant #6 in the baseline scenario, t

$P_{steel,EAFP,PJ,y}$ - steel production in arc-furnace plant #6 in the project scenario, t

$SRMC_{j,EAFP,y}$ - specific raw materials j consumption in arc-furnace plant #6, t /t

$EF_{CO2,lime,y}$ - CO_2 emission factor for lime production, tCO_2/t

j - lime

y - year

Calculation of sinter production in sintering plant in the project scenario ($P_{sinter,PJ,y}$) is provided by formula (1.4.1), in the baseline scenario ($P_{sinter,BL,y}$) – by formula (2.4.1). Calculation of steel production in oxygen-converter plant in the baseline scenario ($P_{steel,BOFP,BL,y}$) is provided by formula (2.1.1). Calculation of steel production in arc-furnace plant #6 in the baseline scenario ($P_{steel,EAFP,BL,y}$) is provided by formula (2.2.1).

(3.3.1) $SRMC_{j,SP,y} = RMC_{j,SP,y} / P_{sinter,y}$

$SRMC_{j,SP,y}$ - specific raw materials j consumption in sintering plant, t /t

$RMC_{j,SP,y}$ - raw materials j consumption in sintering plant, t

$P_{sinter,y}$ - sinter production in sintering plant, t

j - lime

y - year

(3.3.2) $SRMC_{j,BOFP,y} = RMC_{j,BOFP,PJ,y} / P_{steel,BOFP,PJ,y}$

$SRMC_{j,BOFP,y}$ - specific raw materials j consumption in oxygen-converter plant, t /t

$RMC_{j,BOFP,PJ,y}$ - raw materials j consumption in oxygen-converter plant in the project scenario, t

$P_{steel,BOFP,PJ,y}$ - steel production in oxygen-converter plant in the project scenario, t

j - lime

y - year

(3.3.3) $SRMC_{j,EAFP,y} = RMC_{j,EAFP,PJ,y} / P_{steel,EAFP,PJ,y}$

$SRMC_{j,EAFP,y}$ - specific raw materials j consumption in arc-furnace plant #6, t /t

$RMC_{j,EAFP,PJ,y}$ - raw materials j consumption in arc-furnace plant #6 in the project scenario, t

$P_{steel,EAFP,PJ,y}$ - steel production in arc-furnace plant #6 in the project scenario, t

j - lime

y - year

(3.4) $LE_{blast,y} = (P_{iron,PJ,y} – P_{iron,BL,y}) * SC_{blast,BFP,y} * EF_{CO2,blast,y}$

$LE_{blast,y}$ - leakages from blast production, tCO_2

$P_{iron,PJ,y}$ - pig iron production in blast-furnace plant in the project scenario, t

$P_{iron,BL,y}$ - pig iron production in blast-furnace plant in the baseline scenario, t

$SC_{blast,BFP,y}$ - specific blast consumption in blast-furnace plant, thousand m^3/t

$EF_{CO2,blast,y}$ - CO_2 emission factor for blast production, tCO_2/t

y - year

Calculation of pig iron production in the project scenario ($P_{iron,PJ,y}$) is provided by formula (1.3.1), in the baseline scenario ($P_{iron,BL,y}$) – by formula (2.3.1).

(3.4.1) $SC_{blast,BFP,y} = C_{blast,BFP,y} / P_{iron,y}$

$SC_{blast,BFP,y}$ - specific blast consumption in blast-furnace plant, thousand m^3/t

$C_{blast,BFP,y}$ - blast consumption in blast-furnace plant, thousand m^3

$P_{iron,y}$ - pig iron production in blast furnace plant, t

y - year

(3.4.2) $EF_{CO2,blast,y} = \Sigma [FC_{blast,y} * (FC_{i,CHPP,y} / FC_{CHPP,y}) * EF_{CO2,Fi,y}] / P_{blast,y}$

$EF_{CO2,blast,y}$ - emission factor for blast production, tCO_2/t

$FC_{blast,y}$ - fuel consumption for blast production, t of standard fuel

$FC_{i,CHPP,y}$ - fuel i consumption in CHPP, t of standard fuel

$FC_{CHPP,y}$ - fuel consumption in CHPP, t of standard fuel

$EF_{CO2,Fi,y}$ - CO_2 emission factor from fuel i combustion, tCO_2 / t of standard fuel

$P_{blast,y}$ - blast production in CHPP, thousand m^3

i - natural gas, coal

y - year

(3.5) $LE_{elec,y} = (EC_{PJ,y} – EC_{BL,y}) * EF_{CO2,ELEC,y}$

$LE_{elec,y}$ - leakages from electricity production, tCO_2

$EC_{PJ,y}$ - electricity consumption in the project scenario, MWh

$EC_{BL,y}$ - electricity consumption in the baseline scenario, MWh

$EF_{CO2,ELEC,y}$ - CO_2 emission factor for electricity production, tCO_2 / MWh

y - year

(3.5.1) $EC_{PJ,y} = EC_{BFP,PJ,y} + EC_{SP,PJ,y} + EC_{BOFP,PJ,y} + EC_{EAFP,PJ,y} + EC_{RP,PJ,y} + EC_{OP,PJ,y}$

$EC_{PJ,y}$ - electricity consumption in the project scenario, MWh

$EC_{BFP,PJ,y}$ - electricity consumption in blast-furnace plant in the project scenario, MWh

$EC_{SP,PJ,y}$ - electricity consumption in sintering plant in the project scenario, MWh

$EC_{BOFP,PJ,y}$ - electricity consumption in oxygen-converter plant in the project scenario, MWh

$EC_{EAFP,PJ,y}$ - electricity consumption in arc-furnace plant #6 in the project scenario, MWh

$EC_{RP,PJ,y}$ - electricity consumption in rolling plant #3 on mill 1250-3/CBM in the project scenario, MWh

$EC_{OP,PJ,y}$ - electricity consumption for oxygen production in the project scenario, MWh

y - year

(3.5.1.1) $EC_{BFP,PJ,y} = P_{iron,PJ,y} * (EC_{BFP,y} / P_{iron,y})$

$EC_{BFP,PJ,y}$ - electricity consumption in blast-furnace plant in the project scenario, MWh

$P_{iron,PJ,y}$ - pig iron production in blast-furnace plant in the project scenario, t

$EC_{BFP,y}$ - electricity consumption in blast-furnace plant, MWh

$P_{iron,y}$ - pig iron production in blast-furnace plant, t

y - year

Calculation of pig iron production in the project scenario ($P_{iron,PJ,y}$) is provided by formula (1.3.1).

(3.5.1.2) $EC_{SP,PJ,y} = P_{sinter,PJ,y} * (EC_{SP,y} / P_{sinter,y})$

$EC_{SP,PJ,y}$ - electricity consumption in sintering plant in the project scenario, MWh

$P_{sinter,PJ,y}$ - sinter production in sintering plant in the project scenario, t

$EC_{SP,y}$ - electricity consumption in sintering plant, MWh

$P_{sinter,y}$ - sinter production in sintering plant, t

y - year

Calculation of sinter production in sintering plant in the project scenario ($P_{sinter,PJ,y}$) is provided by formula (1.4.1).

(3.5.1.3) $EC_{RP,PJ,y} = (P_{ingots,BOFP,PJ,y} + P_{ingots,EAFP,PJ,y}) * EC_{RP,y} / P_{ingots,y}$

$EC_{RP,PJ,y}$ - electricity consumption in rolling plant #3 on mill 1250-3/CBM in the project scenario, MWh

$P_{ingots,BOFP,PJ,y}$ - ingots production in oxygen-converter plant in the project scenario, t

$P_{ingots,EAFP,PJ,y}$ - ingots production in arc-furnace plant #6 in the project scenario, t

$EC_{RP,y}$ - electricity consumption in rolling plant #3 on mill 1250-3/CBM, MWh

$P_{ingots,y}$ - ingots rolling in rolling plant #3 on mill 1250-3/CBM, t

y - year

(3.5.1.4) $EC_{OP,PJ,y} = [(OC_{BOFP,PJ,y} + OC_{EAFP,PJ,y} + P_{iron,PJ,y} * (OC_{BFP,y} / P_{iron,y}) + (P_{ingots,BOFP,y} + P_{ingots,EAFP,y}) * OC_{RP,y} / P_{ingots,y}] * (EC_{OP,y} / OD_{y})$

$EC_{OP,PJ,y}$ - electricity consumption for oxygen production in the project scenario, MWh

$OC_{BOFP,PJ,y}$ - oxygen consumption in oxygen-converter plant in the project scenario, thousand m^3

$OC_{EAFP,PJ,y}$ - oxygen consumption in arc-furnace plant #6 in the project scenario, thousand m^3

$P_{iron,PJ,y}$ - pig iron production in blast-furnace plant in the project scenario, t

$OC_{BFP,y}$ - oxygen consumption in blast-furnace plant, thousand m^3

$P_{iron,y}$ - pig iron production in blast-furnace plant, t

$P_{ingots,BOFP,PJ,y}$ - ingots production in oxygen-converter plant in the project scenario, t

$P_{ingots,EAFP,PJ,y}$ - ingots production in arc-furnace plant #6 in the project scenario, t

$OC_{RP,y}$ - oxygen consumption in rolling plant #3 on mill 1250-3/CBM, thousand m^3

$P_{ingots,y}$ - ingots rolling in rolling plant #3 on mill 1250-3/CBM, t

$EC_{OP,y}$ - electricity consumption for oxygen production, MWh

OD_{y} - oxygen distribution, thousand m^3

y - year

Calculation of pig iron production in the project scenario ($P_{iron,PJ,y}$) is provided by formula (1.3.1).

(3.5.2) $EC_{BL,y} = EC_{BFP,BL,y} + EC_{SP,BL,y} + EC_{BOFP,BL,y} + EC_{EAFP,BL,y} + EC_{RP,BL,y} + EC_{OP,BL,y}$

$EC_{BL,y}$ - electricity consumption in the baseline scenario, MWh

$EC_{BFP,BL,y}$ - electricity consumption in blast-furnace plant in the baseline scenario, MWh

$EC_{SP,BL,y}$ - electricity consumption in sintering plant in the baseline scenario, MWh

$EC_{BOFP,BL,y}$ - electricity consumption in oxygen-converter plant in the baseline scenario, MWh
$EC_{EAFP,BL,y}$ - electricity consumption in arc-furnace plant #6 in the baseline scenario, MWh
$EC_{RP,BL,y}$ - electricity consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, MWh
$EC_{OP,BL,y}$ - electricity consumption for oxygen production in the baseline scenario, MWh
y - year

(3.5.2.1) $EC_{BFP,BL,y} = P_{iron,BL,y} * (EC_{BFP,y} / P_{iron,y})$
$EC_{BFP,BL,y}$ - electricity consumption in blast-furnace plant in the baseline scenario, MWh
$P_{iron,BL,y}$ - pig iron production in blast-furnace plant in the baseline scenario, t
$EC_{BFP,y}$ - electricity consumption in blast-furnace plant, MWh
$P_{iron,y}$ - pig iron production in blast-furnace plant, t
y - year

Calculation of pig iron production in the baseline scenario ($P_{iron,BL,y}$) is provided by formula (2.3.1).

(3.5.2.2) $EC_{SP,BL,y} = P_{sinter,BL,y} * (EC_{SP,y} / P_{sinter,y})$
$EC_{SP,BL,y}$ - electricity consumption in sintering plant in the baseline scenario, MWh
$P_{sinter,BL,y}$ - sinter production in sintering plant in the baseline scenario, t
$EC_{SP,y}$ - electricity consumption in sintering plant, MWh
$P_{sinter,y}$ - sinter production in sintering plant, t
y - year

Calculation of sinter production in sintering plant in the baseline scenario ($P_{sinter,BL,y}$) is provided by formula (2.4.1).

(3.5.2.3) $EC_{BOFP,BL,y} = P_{steel,BOFP,BL,y} * SEC_{BOFP,BL}$

$EC_{BOFP,BL,y}$ - electricity consumption in oxygen-converter plant in the baseline scenario, MWh

$P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t

$SEC_{BOFP,BL}$ - specific electricity consumption in oxygen-converter plant in the baseline scenario, MWh/t

y - year

Calculation of steel production in oxygen-converter plant in the baseline scenario ($P_{steel,BOFP,BL,y}$) is provided by formula (2.1.1).

(3.5.2.4) $EC_{EAFP,BL,y} = P_{steel,EAFP,BL,y} * EC_{EAFP,PJ,y} / P_{steel,EAFP,PJ,y}$

$EC_{EAFP,BL,y}$ - electricity consumption in arc-furnace plant #6 in the baseline scenario, MWh

$P_{steel,EAFP,BL,y}$ - steel production in arc-furnace plant #6 in the baseline scenario, t

$EC_{EAFP,PJ,y}$ - electricity consumption in arc-furnace plant #6 in the project scenario, MWh

$P_{steel,EAFP,PJ,y}$ - steel production in arc-furnace plant #6 in the project scenario, t

y - year

Calculation of steel production in arc-furnace plant #6 in the baseline scenario ($P_{steel,EAFP,BL,y}$) is provided by formula (2.2.1).

(3.5.2.5) $EC_{RP,BL,y} = (P_{ingots,BOFP,BL,y} + P_{ingots,EAFP,BL,y}) * SEC_{RP,BL}$

$EC_{RP,BL,y}$ - electricity consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, MWh

$P_{ingots,BOFP,BL,y}$ - ingots production in oxygen-converter plant in the baseline scenario, t

$P_{ingots,EAFP,BL,y}$ - ingots production in arc-furnace plant #6 in the baseline scenario, t

$SEC_{RP,BL}$ - specific electricity consumption in rolling plant #3 on mill 1250-3/CBM, MWh / t

y - year

Calculation of ingots production in oxygen-converter plant in the baseline scenario ($P_{ingots,BOFP,BL,y}$) is provided by formula (2.5.2). Calculation of ingots production in arc-furnace plant #6 in the baseline scenario ($P_{ingots,EAFP,BL,y}$) is provided by formula (2.5.3).

(3.5.2.6) $$EC_{OP,BL,y} = [(P_{steel,BOFP,BL,y} * OC_{BOFP,PJ,y} / P_{steel,BOFP,PJ,y} + P_{steel,EAFP,BL,y} * OC_{EAFP,PJ,y} / P_{steel,EAFP,PJ,y} + P_{iron,BL,y} * (OC_{BFP,y} / P_{iron,y}) + (P_{ingots,BOFP,BL,y} + P_{ingots,EAFP,BL,y}) * SOC_{RP,BL}] * (EC_{OP,y} / OD_y)$$

$EC_{OP,BL,y}$ - electricity consumption for oxygen production in the baseline scenario, MWh

$P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t

$OC_{BOFP,PJ,y}$ - oxygen consumption in oxygen-converter plant in the project scenario, thousand m^3

$P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the project scenario, t

$P_{steel,EAFP,BL,y}$ - steel production in arc-furnace plant #6 in the baseline scenario, t

$OC_{EAFP,PJ,y}$ - oxygen consumption in arc-furnace plant #6 in the project scenario, thousand m^3

$P_{steel,EAFP,PJ,y}$ - steel production in arc-furnace plant #6 in the project scenario, t

$P_{iron,BL,y}$ - pig iron production in blast-furnace plant in the baseline scenario, t

$OC_{BFP,y}$ - oxygen consumption in blast-furnace plant, thousand m^3

$P_{iron,y}$ - pig iron production in blast-furnace plant, t

$P_{ingots,BOFP,BL,y}$ - ingots production in oxygen-converter plant in the baseline scenario, t

$P_{ingots,EAFP,BL,y}$ - ingots production in arc-furnace plant #6 in the baseline scenario, t

$SOC_{RP,BL}$ - specific oxygen consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, thousand m^3/ t

$EC_{OP,y}$ - electricity consumption for oxygen production, MWh

OD_y - oxygen distribution, thousand m^3

y - year

Calculation of pig iron production in the baseline scenario ($P_{iron,BL,y}$) is provided by formula (2.3.1). Calculation of steel production in oxygen-converter plant in the baseline scenario ($P_{steel,BOFP,BL,y}$) is provided by formula (2.1.1). Calculation of steel production in arc-furnace plant #6 in the baseline scenario ($P_{steel,EAFP,BL,y}$) is provided by formula (2.2.1). Calculation of ingots production in oxygen-converter plant in the baseline scenario ($P_{ingots,BOFP,BL,y}$) is provided by formula (2.5.2). Calculation of ingots production in arc-furnace plant #6 in the baseline scenario ($P_{ingots,EAFP,BL,y}$) is provided by formula (2.5.3).

(3.5.3) $EF_{CO2,ELEC,y} = (EF_{CO2,ELEC,CHPP,y} * EC_{CHPP,y} + EF_{CO2,ELEC,GRID,y} * EC_{GRID,y}) / (EC_{CHPP,y} + EC_{GRID,y})$

$EF_{CO2,ELEC,y}$ - CO_2 emission factor for electricity production, tCO_2 / MWh

$EF_{CO2,ELEC,CHPP,y}$ - CO_2 emission factor for electricity production in CHPP, tCO_2 / MWh

$EC_{CHPP,y}$ - electricity consumption from CHPP, MWh

$EF_{CO2,ELEC,GRID,y}$ - CO_2 emission factor for electricity production in the grid, tCO_2 / MWh

$EC_{GRID,y}$ - electricity consumption from the grid, MWh

y - year

(3.5.3.1) $EF_{CO2,ELEC,CHPP,y} = \Sigma [FC_{ELEC,y} * (FC_{i,CHPP,y} / FC_{CHPP,y}) * EF_{CO2,Fi,y}] / P_{ELEC,CHPP,y})$

$EF_{CO2,ELEC,CHPP,y}$ - CO_2 emission factor for electricity production in CHPP, tCO_2 / MWh

$FC_{ELEC,y}$ - fuel consumption for electricity production in CHPP, t of standard fuel

$FC_{i,CHPP,y}$ - fuel i consumption in CHPP, t of standard fuel

$FC_{CHPP,y}$ - fuel consumption in CHPP, t of standard fuel

$EF_{CO2,Fi,y}$ - CO_2 emission factor from fuel i combustion, tCO_2 / t of standard fuel

$P_{ELEC,CHPP,y}$ - electricity production in CHPP, MWh

i - natural gas, coal

y - year

(3.6) $LE_{air,y} = (AC_{OP,PJ,y} – AC_{OP,BL,y}) * EF_{CO2,air,y}$

$LE_{air,y}$ - leakages from compressed air production, tCO_2

$AC_{OP,PJ,y}$ - compressed air consumption for oxygen production in the project scenario, thousand m^3

$AC_{OP,BL,y}$ - compressed air consumption for oxygen production in the baseline scenario, thousand m^3

$EF_{CO2,air,y}$ - CO_2 emission factor for compressed air production, tCO_2 / thousand m^3

y - year

(3.6.1) $AC_{OP,PJ,y} = [(OC_{BOFP,PJ,y} + OC_{EAFP,PJ,y} + P_{iron,PJ,y} * (OC_{BFP,y} / P_{iron,y}) + (P_{ingots,BOFP,PJ,y} + P_{ingots,EAFP,PJ,y}) * OC_{RP,y} / P_{ingots,y}] * (AC_{OP,y} / OD_y)$

$AC_{OP,PJ,y}$ - compressed air consumption for oxygen production in the project scenario, thousand m^3

$OC_{BOFP,PJ,y}$ - oxygen consumption in oxygen-converter plant in the project scenario, thousand m^3

$OC_{EAFP,PJ,y}$ - oxygen consumption in arc-furnace plant #6 in the project scenario, thousand m^3

$P_{iron,PJ,y}$ - pig iron production in blast-furnace plant in the project scenario, t

$OC_{BFP,y}$ - oxygen consumption in blast-furnace plant, thousand m^3

$P_{iron,y}$ - pig iron production in blast-furnace plant, t

$P_{ingots,BOFP,PJ,y}$ - ingots production in oxygen-converter plant in the project scenario, t

$P_{ingots,EAFP,PJ,y}$ - ingots production in arc-furnace plant #6 in the project scenario, t

$OC_{RP,y}$ - oxygen consumption in rolling plant #3 on mill 1250-3 / CBM, thousand m^3

$P_{ingots,y}$ - ingots rolling on mill 1250-3 / CBM, t

$AC_{OP,y}$ - compressed air consumption for oxygen production, thousand m^3

OD_y - oxygen distribution, thousand m^3

y - year

Calculation of pig iron production in the project scenario ($P_{iron,PJ,y}$) is provided by formula (1.3.1).

(3.6.2) $AC_{OP,BL,y} = [(P_{steel,BOFP,BL,y} * OC_{BOFP,PJ,y} / P_{steel,BOFP,PJ,y} + P_{steel,EAFP,BL,y} * OC_{EAFP,PJ,y} / P_{steel,EAFP,PJ,y} + P_{iron,BL,y} * (OC_{BFP,y} / P_{iron,y}) + (P_{ingots,BOFP,BL,y} + P_{ingots,EAFP,BL,y}) * SOC_{RP,BL}] * (AC_{OP,y} / OD_y)$

$AC_{OP,BL,y}$ - compressed air consumption for oxygen production in the baseline scenario, thousand m^3

$P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t

$OC_{BOFP,PJ,y}$ - oxygen consumption in oxygen-converter plant in the project scenario, thousand m^3

$P_{steel,BOFP,PJ,y}$ - steel production in oxygen-converter plant in the project scenario, t

$OC_{EAFP,PJ,y}$ - oxygen consumption in arc-furnace plant #6 in the project scenario, thousand m^3

$P_{steel,EAFP,PJ,y}$ - steel production in arc-furnace plant #6 in the project scenario, t

$P_{steel,EAFP,BL,y}$ - steel production in arc-furnace plant #6 in the baseline scenario, t

$P_{iron,BL,y}$ - pig iron production in blast-furnace plant in the baseline scenario, t

$OC_{BFP,y}$ - oxygen consumption in blast-furnace plant, thousand m^3

$P_{iron,y}$ - pig iron production in blast-furnace plant, t

$P_{ingots,BOFP,BL,y}$ - ingots production in oxygen-converter plant in the baseline scenario, t

$P_{ingots,EAFP,BL,y}$ - ingots production in arc-furnace plant #6 in the baseline scenario, t

$SOC_{RP,BL}$ - specific oxygen consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, thousand m^3/ t

$AC_{OP,y}$ - compressed air consumption for oxygen production, thousand m^3

OD_y - oxygen distribution, thousand m^3

y - year

Calculation of pig iron production in the baseline scenario ($P_{iron,BL,y}$) is provided by formula (2.3.1). Calculation of steel production in oxygen-converter plant in the baseline scenario ($P_{steel,BOFP,BL,y}$) is provided by formula (2.1.1). Calculation of steel production in arc-furnace plant #6 in the baseline scenario ($P_{steel,EAFP,BL,y}$) is provided by formula (2.2.1). Calculation of ingots production in oxygen-converter plant in the baseline scenario ($P_{ingots,BOFP,BL,y}$) is provided by formula (2.5.2). Calculation of ingots production in arc-furnace plant #6 in the baseline scenario ($P_{ingots,EAFP,BL,y}$) is provided by formula (2.5.3).

(3.6.3) $$EF_{CO2,air,y} = \Sigma\ [FC_{air,y} * (FC_{i,CHPP,y} / FC_{CHPP,y}) * EF_{CO2,Fi,y}] / P_{air,y}$$

$EF_{CO2,air,y}$ - CO_2 emission factor for compressed air production, tCO_2 / thousand m^3

$FC_{air,y}$ - fuel consumption for compressed air production in CHPP, t of standard fuel

$FC_{i,CHPP,y}$ - fuel i consumption in CHPP, t of standard fuel

$FC_{CHPP,y}$ - fuel consumption in CHPP, t of standard fuel

$EF_{CO2,Fi,y}$ - CO_2 emission factor from fuel i combustion, tCO_2 / t of standard fuel, tCO_2 / t of standard fuel

$P_{air,y}$ - compressed air production in CHPP, thousand m^3

i - natural gas, coal

y - year

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):

(4) $ER_y = BE_y – PE_y – LE_y$

ER_y - emission reductions, tCO_2

BE_y - baseline emissions, tCO_2

PE_y - project emissions, tCO_2

LE_y - leakages, tCO_2

y - year

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 environmental impacts' monitoring of the project is determined by the following basic host party legislation:

- Federal law of the RF "On Protection of the Environment" as of 10/01/2002 No.7-FL;
- Federal law of the RF "On the Protection of Atmospheric Air" as of 04/05/1999 No.96-FL;
- Federal law of the RF "On Production and Consumption Wastes" as of 24/06/1998 No.89-FL.

Environmental monitoring at ChMK is performed by the Environmental Protection Department in accordance with the Regulation "On Environment Department of Occupational Safety and Health, Industrial Safety and Environmental Activities Administration" PP. 065.157-2008 dated 12.09.2008.

The environmental impacts' monitoring includes the quantitative definition of the manufacturing activity impacts on the environment for the current period: pollutant emissions into the atmosphere, waste water release, production and allocation of the manufacturing wastes. The responsible laboratories for measuring of project's environmental impact at ChMK are Central analytical laboratory and Dust-ventilation laboratory.[32]

The information on the environmental impact of project activities is to be stored at ChMK and to be provided as statistical report forms to Federal Service for State Statistics and Federal Service for Ecological, Technical and Atomic Supervision.

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.
Table D.1.1.1 ID-1: $FC_{i,BOFP,PJ,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-2: $RMC_{j,BOFP,PJ,y}$	low	Measuring devices for pig iron, scrap steel, limestone consumption determination are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.. Electrodes consumption is calculated based on certificates of electrodes. Responsible for recording – Head of plant.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-3: $P_{steel,BOFP,PJ,y}$	low	Determined according to the internal procedures: Technological instruction TI KK NR-15-2011, Order #31 dated on 05.03.2012. Responsible for recording – Head of plant.
Table D.1.1.1, D.1.1.3 ID-4: $FC_{i,EAFP,PJ,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-5: $RMC_{j,EAFP,PJ,y}$	low	Measuring devices for pig iron, scrap steel, limestone consumption determination are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.. Electrodes consumption is calculated based on certificates of electrodes.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-6: $P_{steel,EAFP,PJ,y}$	low	Measuring devices for billets production are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK. Ingots production is determined according to the internal procedures: Technological instruction TI KK NR-15-2011. Responsible for recording – Head of plant.

[32] Order # 127 of Russian Federal Service for Accreditation dated on 03.02.2012 about Accreditation of Central analytical laboratory of ChMK. Order # 179 of Russian Federal Service for Accreditation dated on 07.02.2012 about Accreditation of Dust-ventilation laboratory of ChMK.

Table D.1.1.1, D.1.1.3 ID-7: $FC_{i,BFP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-8: $RMC_{j,BFP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-9: $P_{iron,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.1, D.1.1.3 ID-10: $FC_{i,SP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-11: $RMC_{j,SP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-12: $P_{sinter,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.1 ID-13: $FC_{i,RP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.1, D.1.3.1 ID-14: $P_{ingots,y}$	low	Ingots consumption is determined based on certificates of melting. Responsible for recording – Head of plant.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-15: $P_{ingots,BOFP,PJ,y}$	low	Determined according to the internal procedures: Technological instruction TI KK NR-15-2011. Responsible for recording – Head of plant.
Table D.1.1.1, D.1.1.3, D.1.3.1 ID-16: $P_{ingots,EAFP,PJ,y}$	low	Determined according to the internal procedures: Technological instruction TI KK NR-15-2011. Responsible for recording – Head of plant.
Table D.1.1.1, D.1.1.3 ID-17.1: $A_{coke,y}$	low	Date provided by CJSC “Mechel Coke”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Coke”. Additional procedures of quality assurance and quality control are not required.
Table D.1.1.1, D.1.1.3 ID-17.2: $V_{coke,y}$	low	Date provided by CJSC “Mechel Coke”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Coke”. Additional procedures of quality assurance and quality control are not required.

Таблица D.1.1.1, D.1.1.3 ID-17.3: $S_{coke,y}$	low	Date provided by CJSC “Mechel Coke”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Coke”. Additional procedures of quality assurance and quality control are not required.
Table D.1.1.1, D.1.1.3 ID-18: $k_{NG,y}$	low	Date provided by CJSC “Mechel Coke”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Coke”. Additional procedures of quality assurance and quality control are not required.
Table D.1.1.3 ID-19: $P_{CCM-1,BOFP,PJ,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.3 ID-20: $P_{CCM-2,BOFP,PJ,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.1.3 ID-21: $P_{CCM-3,BOFP,PJ,y}$	low	Determined according to the internal procedures: Technological instruction TI KK NR-15-2011. Responsible for recording – Head of plant.
Table D.1.1.3 ID-22: $P_{CCM-4,BOFP,PJ,y}$	low	Determined according to the internal procedures: Technological instruction TI KK NR-15-2011. Responsible for recording – Head of plant.
Table D.1.1.3 ID-23: $P_{CCM-5,BOFP,PJ,y}$	low	Determined according to the internal procedures: Order #31 dated on 05.03.2012. Responsible for recording – Head of plant.
Table D.1.3.1 ID-24: $FC_{CHPP,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.
Table D.1.3.1 ID-25: $FC_{i,CHPP,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.
Table D.1.3.1 ID-26: $FC_{ELEC,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.
Table D.1.3.1 ID-27: $FC_{blast,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.

Table D.1.3.1 ID-28: $FC_{air,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.
Table D.1.3.1 ID-29: $EC_{CHPP,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.
Table D.1.3.1 ID-30: $EC_{GRID,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.
Table D.1.3.1 ID-31: $P_{ELEC,CHPP,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.
Table D.1.3.1 ID-32: $C_{blast,BFP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-33: $P_{blast,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.
Table D.1.3.1 ID-34: $AC_{OP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-35: $P_{air,y}$	low	Date provided by CJSC “Mechel Energo”. Procedures of quality assurance and quality control of the measured parameter are included in the management system CJSC “Mechel Energo”. Additional procedures of quality assurance and quality control are not required.
Table D.1.3.1 ID-36: $EC_{BOFP,PJ,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-37: $EC_{EAFP,PJ,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-38: $EC_{BFP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.

Table D.1.3.1 ID-39: $EC_{SP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-40: $EC_{RP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-41: $EC_{OP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-42: $OC_{BOFP,PJ,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-43: $OC_{EAFP,PJ,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-44: $OC_{BFP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-45: $OC_{RP,y}$	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.
Table D.1.3.1 ID-46: OD_y	low	Measuring devices are calibrated/verified in compliance with the state regulation, in- plant standards and approved methodologies. Responsible department – Metrological Department ChMK.

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

Initial data for GHG emissions monitoring according to the tables (D.1.1.1, D.1.1.3, D.1.3.1) are prepared annually by sintering plant accounting department, blast-furnace plant accounting department, oxygen-converter plant accounting department, arc-furnace plant #6 accounting department, rolling plant #3 accounting department, energy accounting department, bureau of energy consumption, planning and analysis of Chief power engineer administration, laboratory of regimes and electricity use of Central electro-technical laboratory and transferred to ChMK Energy-saving technology center.

If the primary sources of monitoring parameters' data (results of measurements and calculations) are not available during the current monitoring period, the monitoring parameters shall be registered according to the redundant measuring instruments installed inside or outside of the project framework (applicable for the parameters that are weighed) or shall be calculated according to the established procedure and approved methodologies for recording of energy resources consumption (Regulation of ChMK about Energy Resources Recording dated on 23.08.2011).

If the electronic data storage systems are not functioning during the monitoring period, the monitoring data for the previous and current periods shall be available in hard copy in the form of reports. Initial monitoring data shall be recorded and stored in the following documents:

- Report of costs in sintering plant (archived by the sintering plant accounting department);
- Report of costs in blast-furnace plant (archived by the blast-furnace plant accounting department);
- Report of costs in oxygen-converter plant (archived by the oxygen-converter plant accounting department);
- Report of costs in arc-furnace plant #6 (archived by the arc-furnace plant #6 accounting department);
- Report of costs in rolling plant #3 (archived by the rolling plant #3 accounting department);
- Report of costs in oxygen-compressor plant (archived by the oxygen-compressor plant accounting department);
- Reference of CHPP operation issued by CJSC "Mechel Energo" (archived by the bureau of energy consumption, planning and analysis of Chief power engineer administration);
- Reference of electricity consumption from CHPP and from the grid issued by CJSC "Mechel Energo" (archived by the laboratory of regimes and electricity use of Central electro-technical laboratory);
- Reference of physical and chemical parameters of coke issued by CJSC "Mechel-Coke" (archived by the bureau of energy consumption, planning and analysis of Chief power engineer administration).

These reports are prepared and archived in electronic and paper form which allows for access to the necessary data during the whole monitoring period.

ChMK Energy-Saving Technology Center submits annually initial monitoring data to CJSC «National Carbon Sequestration Foundation» in order to calculate GHG emission reductions, as well as stores the monitoring data in electronic and paper form. Calculation of actual GHG emission reductions is performed annually by CJSC «National Carbon Sequestration Foundation» in accordance with the formulas given in Sections D.1.1.2, D.1.1.4, D.1.3.2. Calculation model in the MS Excel format is used to monitoring. Monitoring report is compiled by CJSC «National Carbon Sequestration Foundation» and approved by ChMK.

Procedures for collecting, processing, transfer and storage of the initial monitoring data, as well as procedures for quality assurance and quality control will be incorporated into the existing management system of ChMK. The Quality Management System at ChMK is certified according to the ISO 9001:2008.[33]

Initial monitoring data and the monitoring results will be archived in electronic and paper form by ChMK Energy-Saving Technology Center during the crediting period and two years after the last transaction within ERUs.

[33] Certificate of TÜV Rheinland InterCert dated on 03.04.2010.

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

The monitoring plan has been developed by:

CJSC "National Carbon Sequestration Foundation"

Contact person: Mr. Roman Kazakov, principal specialist

Tel.: +7 499 788 78 35 ext. 113

Fax: +7 499 788 78 35 ext. 107

E-mail: kazakovra@ncsf.ru

CJSC "National Carbon Sequestration Foundation" is not a project participant.

SECTION E. Estimation of greenhouse gas emission reductions

Estimation of GHG emissions in project and baseline scenario and GHG emission reductions is made based on actual data for 2008-2011 and forecasted data for 2012-2020 using the formulae given in the section D.[34]

E.1. Estimated project emissions:

Table E.1-1. Estimated project emissions during the first commitment period

#	Emission source	Unit	Year				
			2008	2009	2010	2011	2012
1.	Sintering plant	tCO_2 equivalent	937 441	743 185	791 469	833 684	905 345
2.	Blast-furnace plant	tCO_2 equivalent	4 961 551	5 072 037	5 497 002	5 074 538	5 634 191
3.	Oxygen-converter plant	tCO_2 equivalent	423 550	438 645	466 360	426 498	477 640
4.	Arc-furnace plant #6	tCO_2 equivalent	52 163	49 827	51 767	51 790	62 601
5.	Rolling plant #3. Mill 1250-3 / CBM	tCO_2 equivalent	5 913	9 195	13 882	9 018	3 792
6.	Total	tCO_2 equivalent	6 380 618	6 312 889	6 820 480	6 395 528	7 083 569

Table E.1-2. Estimated project emissions after the first commitment period in 2013-2016

#	Emission source	Unit	Year			
			2013	2014	2015	2016
1.	Sintering plant	tCO_2 equivalent	905 345	905 345	905 345	905 345
2.	Blast-furnace plant	tCO_2 equivalent	5 634 191	5 634 191	5 634 191	5 634 191
3.	Oxygen-converter plant	tCO_2 equivalent	477 640	477 640	477 640	477 640
4.	Arc-furnace plant #6	tCO_2 equivalent	62 601	62 601	62 601	62 601
5.	Rolling plant #3. Mill 1250-3 / CBM	tCO_2 equivalent	3 792	3 792	3 792	3 792
6.	Total	tCO_2 equivalent	7 083 569	7 083 569	7 083 569	7 083 569

[34] Calculation of GHG emission reductions including initial data is attached in Excel file: 2012-03-05_GHG Estimation_ChMK_ver.01.xlsx

Table E.1-3. Estimated project emissions after the first commitment period in 2017-2020

#	Emission source	Unit	Year			
			2017	2018	2019	2020
1.	Sintering plant	tCO_2 equivalent	905 345	905 345	905 345	905 345
2.	Blast-furnace plant	tCO_2 equivalent	5 634 191	5 634 191	5 634 191	5 634 191
3.	Oxygen-converter plant	tCO_2 equivalent	477 640	477 640	477 640	477 640
4.	Arc-furnace plant #6	tCO_2 equivalent	62 601	62 601	62 601	62 601
5.	Rolling plant #3. Mill 1250-3 / CBM	tCO_2 equivalent	3 792	3 792	3 792	3 792
6.	Total	tCO_2 equivalent	7 083 569	7 083 569	7 083 569	7 083 569

E.2. Estimated leakage:

Table E.2-1. Estimated leakages during the first commitment period

#	Emission source	Unit	Year				
			2008	2009	2010	2011	2012
1.	Pellet production	tCO_2 equivalent	- 3 716	- 5 717	- 6 585	- 5 352	- 8 002
2.	Coke production	tCO_2 equivalent	- 109 847	- 113 879	- 121 747	- 131 312	- 180 085
3.	Lime production	tCO_2 equivalent	- 73 257	- 75 157	- 81 564	- 90 274	- 120 913
4.	Blast production	tCO_2 equivalent	- 20 736	- 20 416	- 22 368	- 24 054	- 33 123
5.	Electricity production	tCO_2 equivalent	-6 930	- 16 113	- 5 902	5 254	- 41 766
6.	Compressed air production	tCO_2 equivalent	-8 331	- 8 494	- 8 352	- 9 929	- 13 332
7.	Total	tCO_2 equivalent	-222 817	- 239 776	- 246 518	- 255 667	- 397 221

Table E.2-2. Estimated leakages after the first commitment period in 2013-2016

#	Emission source	Unit	Year			
			2013	2014	2015	2016
1.	Pellet production	tCO_2 equivalent	- 8 002	- 8 002	- 8 002	- 8 002
2.	Coke production	tCO_2 equivalent	- 180 085	- 180 085	- 180 085	- 180 085
3.	Lime production	tCO_2 equivalent	- 120 913	- 120 913	- 120 913	- 120 913
4.	Blast production	tCO_2 equivalent	- 33 123	- 33 123	- 33 123	- 33 123
5.	Electricity production	tCO_2 equivalent	- 41 766	- 41 766	- 41 766	- 41 766
6.	Compressed air production	tCO_2 equivalent	- 13 332	- 13 332	- 13 332	- 13 332
7.	Total	tCO_2 equivalent	- 397 221	- 397 221	- 397 221	- 397 221

Table E.2-3. Estimated leakages after the first commitment period in 2017-2020

#	Emission source	Unit	Year			
			2017	2018	2019	2020
1.	Pellet production	tCO_2 equivalent	- 8 002	- 8 002	- 8 002	- 8 002
2.	Coke production	tCO_2 equivalent	- 180 085	- 180 085	- 180 085	- 180 085
3.	Lime production	tCO_2 equivalent	- 120 913	- 120 913	- 120 913	- 120 913
4.	Blast production	tCO_2 equivalent	- 33 123	- 33 123	- 33 123	- 33 123
5.	Electricity production	tCO_2 equivalent	- 41 766	- 41 766	- 41 766	- 41 766
6.	Compressed air production	tCO_2 equivalent	- 13 332	- 13 332	- 13 332	- 13 332
7.	Total	tCO_2 equivalent	- 397 221	- 397 221	- 397 221	- 397 221

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

Table E.3-1. Estimated project emissions and leakages during the first commitment period

#	Parameter	Unit	Year				
			2008	2009	2010	2011	2012
1.	Project emissions	tCO_2 equivalent	6 380 618	6 312 889	6 820 480	6 395 528	7 083 569
2.	Leakage	tCO_2 equivalent	- 222 817	- 239 776	- 246 518	- 255 667	- 397 221
3.	Total	tCO_2 equivalent	6 157 801	6 073 113	6 573 962	6 139 861	6 686 348

Table E.3-2. Estimated project emissions and leakages after the first commitment period 2013-2016

#	Parameter	Unit	Year			
			2013	2014	2015	2016
1.	Project emissions	tCO_2 equivalent	7 083 569	7 083 569	7 083 569	7 083 569
2.	Leakage	tCO_2 equivalent	- 397 221	- 397 221	- 397 221	- 397 221
3.	Total	tCO_2 equivalent	6 686 348	6 686 348	6 686 348	6 686 348

Table E.3-3. Estimated project emissions and leakages after the first commitment period 2017-2020

#	Parameter	Unit	Year			
			2017	2018	2019	2020
1.	Project emissions	tCO_2 equivalent	7 083 569	7 083 569	7 083 569	7 083 569
2.	Leakage	tCO_2 equivalent	- 397 221	- 397 221	- 397 221	- 397 221
3.	Total	tCO_2 equivalent	6 686 348	6 686 348	6 686 348	6 686 348

E.4. Estimated baseline emissions:

Table E.4-1. Estimated baseline emissions during the first commitment period

#	Emission source	Unit	Year				
			2008	2009	2010	2011	2012
1.	Sintering plant	tCO_2 equivalent	1 042 949	831 104	884 105	943 432	1 055 265
2.	Blast-furnace plant	tCO_2 equivalent	5 519 964	5 672 060	6 140 388	5 742 559	6 567 180
3.	Oxygen-converter plant	tCO_2 equivalent	424 980	460 732	500 031	459 079	523 224
4.	Arc-furnace plant #6	tCO_2 equivalent	52 163	49 827	51 767	51 790	62 601
5.	Rolling plant #3. Mill 1250-3 / CBM	tCO_2 equivalent	89 517	93 619	101 613	92 426	103 858
6.	Total	tCO_2 equivalent	7 129 573	7 107 342	7 677 904	7 289 286	8 312 128

Table E.4-2. Estimated baseline emissions after the first commitment period in 2013-2016

#	Emission source	Unit	Year			
			2013	2014	2015	2016
1.	Sintering plant	tCO_2 equivalent	1 055 265	1 055 265	1 055 265	1 055 265
2.	Blast-furnace plant	tCO_2 equivalent	6 567 180	6 567 180	6 567 180	6 567 180
3.	Oxygen-converter plant	tCO_2 equivalent	523 224	523 224	523 224	523 224
4.	Arc-furnace plant #6	tCO_2 equivalent	62 601	62 601	62 601	62 601
5.	Rolling plant #3. Mill 1250-3 / CBM	tCO_2 equivalent	103 858	103 858	103 858	103 858
6.	Total	tCO_2 equivalent	8 312 128	8 312 128	8 312 128	8 312 128

Table E.4-3. Estimated baseline emissions after the first commitment period in 2017-2020

#	Emission source	Unit	Year			
			2017	2018	2019	2020
1.	Sintering plant	tCO_2 equivalent	1 055 265	1 055 265	1 055 265	1 055 265
2.	Blast-furnace plant	tCO_2 equivalent	6 567 180	6 567 180	6 567 180	6 567 180
3.	Oxygen-converter plant	tCO_2 equivalent	523 224	523 224	523 224	523 224
4.	Arc-furnace plant #6	tCO_2 equivalent	62 601	62 601	62 601	62 601
5.	Rolling plant #3. Mill 1250-3 / CBM	tCO_2 equivalent	103 858	103 858	103 858	103 858
6.	Total	tCO_2 equivalent	8 312 128	8 312 128	8 312 128	8 312 128

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

Table E.5-1. Estimated emission reductions during the first commitment period

#	Parameter	Unit	Year				
			2008	2009	2010	2011	2012
1.	Difference between E.4. and E.3. representing the emission reductions of the project	tCO_2 equivalent	971 772	1 034 229	1 103 942	1 149 425	1 625 780

Table E.5-2. Estimated emission reductions after the first commitment period in 2013-2016

#	Parameter	Unit	Year			
			2013	2014	2015	2016
1.	Difference between E.4. and E.3. representing the emission reductions of the project	tCO_2 equivalent	1 625 780	1 625 780	1 625 780	1 625 780

Table E.5-3. Estimated emission reductions after the first commitment period in 2017-2020

#	Parameter	Unit	Year			
			2017	2018	2019	2020
1.	Difference between E.4. and E.3. representing the emission reductions of the project	tCO_2 equivalent	1 625 780	1 625 780	1 625 780	1 625 780

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

Table E.6-1. Table containing results of emission reductions estimation during the first commitment 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)
2008	6 380 618	- 222 817	7 129 573	971 772
2009	6 312 889	- 239 776	7 107 342	1 034 229
2010	6 820 480	- 246 518	7 677 904	1 103 942
2011	6 395 528	- 255 667	7 289 286	1 149 425
2012	7 083 569	- 397 221	8 312 128	1 625 780
Total (tonnes of CO_2 equivalent)	32 993 084	- 1 361 999	37 516 233	5 885 148

Table E.6-2. Table containing results of emission reductions estimation after the first commitment 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)
2013	7 083 569	- 397 221	8 312 128	1 625 780
2014	7 083 569	- 397 221	8 312 128	1 625 780
2015	7 083 569	- 397 221	8 312 128	1 625 780
2016	7 083 569	- 397 221	8 312 128	1 625 780
2017	7 083 569	- 397 221	8 312 128	1 625 780
2018	7 083 569	- 397 221	8 312 128	1 625 780
2019	7 083 569	- 397 221	8 312 128	1 625 780
2020	7 083 569	- 397 221	8 312 128	1 625 780
Total (tonnes of CO_2 equivalent)	56 668 552	- 3 177 768	66 497 024	13 006 240

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:

An environment impact assessment is an integral and indispensable part of the project documentation for the construction, expansion, reconstruction, etc. of commercial or industrial facilities.

The environment impact assessment of ChMK projects is made in accordance with the applicable legislation of the Russian Federation (RF) related to the planned commercial (and other) activities:

- Federal law of the RF "On Protection of the Environment" as of 10.01.2002 #7-FL;
- Federal law of the RF "On Ecological Examinations" as of 25.11.1995 #174-FL;
- Federal law of the RF "On the Sanitary and Epidemiological Safety of the Population" as of 30.03.1999 #52-FL;
- Federal law of the RF "On the Protection of Atmospheric Air" as of 04.05.1999 #96-FL;
- Federal law of the RF "On Production and Consumption Wastes" as of 24.06.1998 #89-FL;
- Sanitary Regulations and Standards 2.2.1/2/1/1200-03 "Sanitary Protection Zones and Sanitary Classification of Companies, Buildings and other Facilities";
- Sanitary Regulations and Standards "Instructions on the development, coordination, approval and composition of design estimate documentation";
- Regulation on the evaluation of planned commercial and other activities on the environment in the Russian Federation approved by the order of the State Committee for Environmental Protection #372 as of 16.05.2000.

Materials on the environmental impact assessment of the project are presented in the project documentation:

- Oxygen-Converter Plant. Continuous Casting Plant. Detailed Design. Volume 4. Environmental Impact Assessment. CH-01935-OVOS. // OJSC «Chelyabgipromez» – Chelyabinsk, 2004;
- Oxygen-Converter Plant. Reconstruction. CCM-4. Detailed Design. Volume 4. Environmental Impact Assessment. CH-01952-OVOS. // OJSC «Chelyabgipromez» – Chelyabinsk, 2007;
- Oxygen-Converter Plant. Reconstruction. CCM-4 Complex. Phase 2. Stage 1. LF-3 Installation. Volume 5. List of Environment Protection Measures. CH-10014-OOS.P. // OJSC «Chelyabgipromez» – Chelyabinsk, 2008;
- Arc-Furnace Plant #6. CCM Renewal. LF and Vacuum Vessel Installation. Slab Production Increase up to 1 200 000 Tons per Year. Detailed Design. Approvable Part. Volume 5. List of Environment Protection Measures. CH-10002-OOS.P. // OJSC «Chelyabgipromez» – Chelyabinsk, 2008;
- Oxygen-Converter Plant. Reconstruction. Installation of Blooming CCM-5, LF-4 and Vacuum Vessel. Project Documentation. Volume 11. List of Environment Protection Measures. CH-10018-OOS.P. // OJSC «Chelyabgipromez» – Chelyabinsk, 2011.

On the whole, assessment of results with regard to the project's impact on the environment shows that the project implementation will not result in a significant impact on the environment and trans-boundary effects.[35]

[35] Pollutant emissions calculations are provided as a part of the detailed design documentation.

ChMK has the necessary permissions with regard to the project's impact on the environment for the duration of the crediting period.

Permissions for air pollutant emissions:

- Permission for air pollutant emissions #882 dated on 01.01.2006 issued by the Directorate for Technological and Ecological Supervision of the Rostekhnadzor for the Chelyabinsk region for the period from 01.01.2006 to 01.07.2008;
- Permission for air pollutant emissions #1776 dated on 01.11.2008 issued by the Directorate for Technological and Ecological Supervision of the Rostekhnadzor for the Chelyabinsk region for the period from 01.07.2008 to 01.07.2009;
- Permission for air pollutant emissions #1980 dated on 22.06.2009 issued by the Directorate for Technological and Ecological Supervision of the Rostekhnadzor for the Chelyabinsk region for the period from 01.07.2009 to 31.12.2009;
- Permission for air pollutant emissions #Ch-2146 dated on 18.01.2010 issued by the Directorate for Technological and Ecological Supervision of the Rostekhnadzor for the Chelyabinsk region for the period from 01.01.2010 to 01.01.2011;
- Emission allowance for airborne contaminants # Ch-2437 dated 27.09.2010 issued by the Directorate for Technological and Ecological Supervision of the Rostekhnadzor for the Chelyabinsk region for the period from 07.09.2010 to 06.09.2015.

Permissions for discharge of pollutants into bodies of water:

- Permission for discharge of pollutants into the environment (bodies of water) #211 dated on 11.12.2007 issued by the Directorate for Technological and Ecological Supervision of the Rostekhnadzor for the Chelyabinsk region for the period from 01.01.2008 to 01.01.2009;
- Permission for discharge of pollutants into the environment (bodies of water) #282 dated on 01.12.2008 issued by the Directorate for Technological and Ecological Supervision of the Rostekhnadzor for the Chelyabinsk region for the period from 01.01.2009 to 31.12.2012.

Permissions for disposal and recovery of waste materials:

- License to carry out activities associated with hazardous waste management #74M04/0019/L dated on 30.04.2004 issued by the General Directorate for Natural Resources and Environmental Protection of MNR of Russia for the Chelyabinsk region for the period from 30.04.2004 to 30.04.2009;
- License to carry out activities associated with hazardous waste management # OT-56-002712 (74) dated on 08.04.2009 of Federal Service of Ecological, Technological and Atomic Supervision for the period from 08.04.2009 to 08.04.2014.

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:

Results of the environmental impact assessment of the planned commercial and other activities are subject to a state expert review.[36]

ChMK projects have passed the state expert review:

- Conclusion #539 of the State Environmental Expertise Committee with regard to the detailed design «ChMK. Oxygen-Converter Plant. Continuous Casting Plant» issued by the General Directorate for Natural Resources and Environmental Protection of MNR of Russia for the Chelyabinsk region dated on 30.08.2004;
- Positive conclusion of the State Expert Review #653-07/GGE-4798/02 with regard to the project documentation «ChMK. Oxygen-Converter Plant. CCM-4 Complex» issued by FSI GLAVGOSEXPERTIZA OF RUSSIA dated on 12.09.2007;
- Positive conclusion of the State Expert Review #560-09/GGE-4798/02 with regard to the project documentation « ChMK. Oxygen-Converter Plant. Reconstruction. CCM-4 Complex. Phase 2. Stage 1. LF-3 Installation» issued by FSI GLAVGOSEXPERTIZA OF RUSSIA dated on 10.09.2009;
- Positive conclusion of the State Expert Review #611-11/GGE-7407/02 with regard to the project documentation «ChMK. Oxygen-Converter Plant. Reconstruction. Installation of Blooming CCM-5, LF-4 and Vacuum Vessel» issued by FSI GLAVGOSEXPERTIZA OF RUSSIA dated on 22.06.2011;
- Positive conclusion of the State Expert Review #133-10/GGE-6510/02 with regard to the project documentation «ChMK. Arc-Furnace Plant #6. Reconstruction of CCM. Installation LF and Vacuum Vessel. Slab Production Increase up to 1 200 000 Tons per Year» issued by FSI GLAVGOSEXPERTIZA OF RUSSIA dated 25.02.2010;

Positive conclusion of the state expert review confirm compliance of the design activities with the current Russian legislation in the field of environmental protection, i.e. confirm the acceptable level of the project impact on air, surface water bodies and groundwater, acceptable impact of production and consumption waste on land resources, flora and fauna at all stages of its implementation from construction to decommissioning.

[36] Links to the developed materials of the EIA project and regulatory legal acts are given in Section F.1.

SECTION G. Stakeholders' comments

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

The ChMK projects implemented as joint implementation project for metallurgical production reconstruction have gone through the process of public consultations and received approval of the stakeholders.

Results of public consultations are listed in the following documents:

- Protocol dated on 26.05.2004 of the meeting on the issue of environmental impact of the facilities being constructed at ChMK (Continuous Casting Plant, CCM-3 Complex);
- Letter to the administration of the Chelyabinsk Metallurgichesky district #212-05 dated on 28.04.2006 with regard to public consultations on issues relating to environmental aspects of the facilities planned for construction within the territory of ChMK (Oxygen-converter plant. CCM-4 Complex);
- Protocol dated on 22.05.2009 of the meeting on the issue of environmental impact of construction of the facility «ChMK. Oxygen-converter Plant. CCM-4 Complex. Phase 2»;
- Protocol dated on 22.05.2009 of the meeting on the issue of environmental impact of construction of the facility «ChMK. Arc-furnace plant #6. Renewal of CCM. Installation of LF and Vacuum Vessel. Slab Production Increase up to 1,200,000 Tons per Year»;
- Protocol dated on 22.12.2010 of the meeting on the issue of environmental impact of construction of the facility «ChMK. Oxygen-converter Plant. Reconstruction. Installation of Blooming CCM-5».

Representatives of ChMK, OJSC «Chelyabgipromez», the administration of the Chelyabinsk Metallurgichesky district, as well as members of the public have taken part in the public consultations.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Represented by:	Alexander Sadyrin
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CJSC “National Carbon Sequestration Foundation” is not a project participant.

Annex 2

BASELINE INFORMATION

Table containing the key elements of the baseline[37]

#	Parameter	Description	Source		Comment
1.	$P_{sinter,y}$	Sinter production in sintering plant	Year	t	Reports of costs in sintering plant ChMK for 2008-2011, forecasted data for 2012.
			2008	4 751 198	
			2009	4 494 921	
			2010	4 755 724	
			2011	4 578 774	
			2012	5 249 996	
2.	$P_{iron,y}$	Pig iron production in blast-furnace plant	Year	t	Reports of costs in blast-furnace plant ChMK for 2008-2011, forecasted data for 2012
			2008	3 500 153	
			2009	3 804 808	
			2010	4 148 923	
			2011	3 728 017	
			2012	4 160 241	
3.	$P_{steel,BOFP,PJ,y}$	Steel production in oxygen-converter plant	Year	t	Reports of costs in oxygen-converter plant ChMK for 2008-2011, forecasted data for 2012
			2008	3 351 143	
			2009	3 500 513	
			2010	3 747 762	
			2011	3 464 448	
			2012	3 826 923	
4.	$P_{steel,EAFP,PJ,y}$	Steel production in arc-furnace plant #6	Year	t	Reports of costs in arc-furnace plant #6 ChMK for 2008-2011, forecasted data for 2012
			2008	555 527	
			2009	474 086	
			2010	647 386	
			2011	662 965	
			2012	701 257	

[37] Detailed information about choice and justification of key elements is provided in the section B.1 of the PDD.

#	Parameter	Description	Source		Comment
			Year	t	
5.	$P_{ingots,y}$	Steel ingots rolled in rolling plant #3 on mill 1250-3 / continuous billet mill	2008	2 275 777	Reports of costs in rolling plant #3 ChMK for 2008-2011, forecasted data for 2012.
			2009	2 204 645	
			2010	2 332 531	
			2011	1 650 951	
			2012	1 104 104	

Annex 3

MONITORING PLAN

Parameters which are determined once and are taken as constants for the whole monitoring period and are available at the stage of determination.

Data / parameter	**$W_{C,steel,y}$**
Data unit	tC/t
Description	carbon content in steel
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 3. Industrial Processes and Product Use, Chapter 4. Metal Industry Emissions, Table. 4.3, p. 4.27
Value of data (for ex ante calculations/determinations)	0,01
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The average value of carbon content in steel produced at ChMK is less than default value. Therefore the use of default value (0,01 tC/t) provides to the conservative assumption of GHG emissions reductions.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$W_{C,steel\ scrap,y}$**
Data unit	tC/t
Description	carbon content in scrap steel
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 3. Industrial Processes and Product Use, Chapter 4. Metal Industry Emissions, Table. 4.3, p. 4.27
Value of data (for ex ante calculations/determinations)	0,01

Justification of the choice of data or description of measurement methods and procedures (to be) applied	The carbon content in scrap steel cannot be measured at ChMK. Therefore the default value is used.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	$\mathbf{W_{C,pig\ iron,y}}$
Data unit	tC/t
Description	carbon content in pig iron
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 3. Industrial Processes and Product Use, Chapter 4. Metal Industry Emissions, Table. 4.3, p. 4.27
Value of data (for ex ante calculations/determinations)	0,04
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The chosen value of carbon content in pig iron has not an influence on the achieved emission reductions as the carbon in pig iron is oxidized in any case by steel production.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	$\mathbf{W_{C,electrodes,y}}$
Data unit	tC/t
Description	carbon content in electrodes
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 3. Industrial Processes and Product Use, Chapter 4. Metal Industry Emissions, Table. 4.3, p. 4.27

Value of data (for ex ante calculations/determinations)	0,82
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The carbon content in electrodes cannot be measured at ChMK. Therefore the default value is used.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	$\mathbf{W_{C,limestone,y}}$
Data unit	tC/t
Description	carbon content in limestone
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 3. Industrial Processes and Product Use, Chapter 4. Metal Industry Emissions, Table. 4.3, p. 4.27
Value of data (for ex ante calculations/determinations)	0,12
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The carbon content in limestone cannot be measured at ChMK. Therefore the default value is used.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	$\mathbf{W_{C,NG,default}}$
Data unit	tC/TJ
Description	Default carbon content in natural gas
Time of determination/monitoring	Determined ex ante

Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 2. Energy, Chapter 1. Introduction, Table. 1.4, p. 1.23-1.24
Value of data (for ex ante calculations/determinations)	15,30
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The certificates of natural gas provided from gas supplier have not information about chemical composition of fuel. Therefore the default value is used.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	$\mathbf{EF_{NG,default}}$
Data unit	tCO_2/TJ
Description	Default CO_2 emission factor from natural gas combustion
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 2. Energy, Chapter 1. Introduction, Table. 1.4, p. 1.23-1.24
Value of data (for ex ante calculations/determinations)	56,10
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The certificates of natural gas provided from gas supplier have not information about chemical composition of fuel. Therefore the default value is used.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	$\mathbf{EF_{coal,default}}$
Data unit	tCO_2/TJ
Description	Default CO_2 emission factor from coal combustion

Time of determination/monitoring	Determined ex ante
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 2. Energy, Chapter 1. Introduction, Table. 1.4, p. 1.23-1.24
Value of data (for ex ante calculations/determinations)	94,60
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The coal is used in the CHPP that is not under the control of the project participants. Therefore the default value is used.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$EF_{CO2,NG,y}$**
Data unit	tCO_2 / t of standard fuel
Description	Emission factor from natural gas combustion
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Calculated
Value of data (for ex ante calculations/determinations)	1,644
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by formula: $EF_{CO2,NG,y} = EF_{NG,default} * k_{J/cal} * k_{kcal/kg\ c.e.} * 10^{-6}$ $EF_{NG,default}$ - default CO_2 emission factor from natural gas combustion, tCO_2/TJ $k_{J/cal}$ - conversion factor, J/cal $k_{kcal/kg\ c.e.}$ - conversion factor, kcal / kg of standard fuel Choice of the parameters value $EF_{NG,default}$, $k_{J/cal}$, $k_{kcal/kg\ c.e.}$ is stated in the Annex 3 PDD.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$EF_{CO2,coal,y}$**
Data unit	tCO_2 / t of standard fuel
Description	Emission factor from coal combustion
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Calculated
Value of data (for ex ante calculations/determinations)	2,772
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by formula: $EF_{CO2,coal,y} = EF_{coal,default} * k_{J/cal} * k_{kcal/kg\ c.e.} * 10^{-6}$ $EF_{coal,default}$ - default CO_2 emission factor from natural gas combustion, tCO_2/TJ $k_{J/cal}$ - conversion factor, J/cal $k_{kcal/kg\ c.e.}$ - conversion factor, kcal / kg of standard fuel Choice of the parameters value $EF_{NG,default}$, $k_{J/cal}$, $k_{kcal/kg\ c.e.}$ is stated in the Annex 3 PDD.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$k_{J/cal}$**
Data unit	J/cal
Description	Conversion factor
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Foundations of Modern Power Industry: A course of lectures for managers of energy companies. In two parts / Under the general supervision of Corr. RAS E.V. Ametistov. – Part 1. Truchnij A.D., Makarov A.A., Klimenko V.V. – Moscow: Publishing House of MEI, 2002. - 368 p.
Value of data (for ex ante calculations/determinations)	4,1862

Justification of the choice of data or description of measurement methods and procedures (to be) applied	-
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$k_{kcal/kg\ c.e.}$**
Data unit	kcal / kg of standard fuel
Description	Conversion factor
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Foundations of Modern Power Industry: A course of lectures for managers of energy companies. In two parts / Under the general supervision of Corr. RAS E.V. Ametistov. – Part 1. Truchnij A.D., Makarov A.A., Klimenko V.V. – Moscow: Publishing House of MEI, 2002. - 368 p.
Value of data (for ex ante calculations/determinations)	7000
Justification of the choice of data or description of measurement methods and procedures (to be) applied	-
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$EF_{CO2,ELEC,GRID,y}$**
Data unit	tCO_2/MWh
Description	CO_2 emission factor for electricity generation in the grid
Time of determination/monitoring	Determined ex ante

Source of data (to be) used	Operational Guidelines for Project Design Documents of Joint Implementation Projects. Volume 1: General guidelines. Version 2.3. - Ministry of Economic Affairs of the Netherlands, 2004, p.43
Value of data (for ex ante calculations/determinations)	2008: 0,565 2009: 0,557 2010: 0,550 2011: 0,542 2012: 0,534
Justification of the choice of data or description of measurement methods and procedures (to be) applied	The provided values of CO_2 emission factor for electricity generation in the grid is used in the JI projects determined by the accredited independent entity (AIE) and approved by Russian Federation. E.g., Reconstruction of the steelmaking at JSC "Ashinskiy Metallurgical Works", Asha, Russian Federation.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$EF_{CO2,pellet,y}$**
Data unit	tCO_2/t
Description	CO_2 emission factor for pellets production
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 3. Industrial Processes and Product Use, Chapter 4. Metal Industry Emissions, Table. 4.1, p. 4.25
Value of data (for ex ante calculations/determinations)	0,03
Justification of the choice of data or description of measurement methods and procedures (to be) applied	CO_2 emission factor cannot be directly monitored as the pellets production is not under the control of project participants. The value of emission factor is determined for the European enterprises that are mainly more efficiency than the Russian. Therefore the value chosen provides to the conservative assumption of GHG emission reductions.

QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$EF_{CO2,coke,y}$**
Data unit	tCO_2/t
Description	CO_2 emission factor for coke production
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 3. Industrial Processes and Product Use, Chapter 4. Metal Industry Emissions, Table. 4.1, p. 4.25
Value of data (for ex ante calculations/determinations)	0,56
Justification of the choice of data or description of measurement methods and procedures (to be) applied	CO_2 emission factor cannot be directly monitored as the coke production is not under the control of project participants. The value of emission factor is determined for the European enterprises that are mainly more efficiency than the Russian. Therefore the value chosen provides to the conservative assumption of GHG emission reductions.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$EF_{CO2,lime,y}$**
Data unit	tCO_2/t
Description	CO_2 emission factor for lime production
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Reference Document on Best Available Techniques in the Cement, Lime and Magnesium Oxide Manufacturing Industries, European Commission, May 2010. – Table 2.24, p. 246.

Value of data (for ex ante calculations/determinations)	1,481
Justification of the choice of data or description of measurement methods and procedures (to be) applied	CO_2 emission factor cannot be directly monitored as the lime production is not under the control of project participants. The value of emission factor is determined for the European enterprises that are mainly more efficiency than the Russian. Therefore the value chosen provides to the conservative assumption of GHG emission reductions.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$P_{billets,BOFP,BL,max}$**
Data unit	t
Description	maximal continuous billets production from the oxygen-converter steel in the baseline scenario
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Estimated
Value of data (for ex ante calculations/determinations)	144 610
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Estimated based on actual production data of CCM-1 and CCM-2 from the oxygen-converter steel for 2004-2006.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$SFC_{i,BOFP,BL,y}$**
Data unit	thousand m^3 / t
Description	Specific natural gas consumption in oxygen-converter plant in the baseline scenario
Time of determination/monitoring	Determined ex ante

Source of data (to be) used	Calculated
Value of data (for ex ante calculations/determinations)	0,006
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by formula: $SFC_{i,BOFP,BL,y} = FC_{i,BOFP,BL,y} / P_{steel,BOFP,BL,y}$ $SFC_{i,BOFP,BL,y}$ - specific natural gas consumption in oxygen-converter plant in the baseline scenario, thousand m^3 / t $FC_{i,BOFP,BL,y}$ - natural gas consumption in oxygen-converter plant in the baseline scenario, thousand m^3 $P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t Initial data are taken from Reports of costs in oxygen-converter plant ChMK for 2002-2004.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$SRMC_{j,BOFP,BL,y}$**
Data unit	kg / t
Description	Specific electrodes consumption in oxygen-converter plant in the baseline scenario
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Calculated
Value of data (for ex ante calculations/determinations)	0,119
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by formula: $SFC_{i,BOFP,BL,y} = RMC_{i,BOFP,BL,y} / P_{steel,BOFP,BL,y}$ $SFC_{i,BOFP,BL,y}$ - specific electrodes consumption in oxygen-converter plant in the baseline scenario, kg / t $FC_{i,BOFP,BL,y}$ - electrodes consumption in oxygen-converter plant in the baseline scenario, kg $P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t

	Initial data are taken from Reports of costs in oxygen-converter plant ChMK for 2002-2004.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	$SC_{steel/billet,BL}$
Data unit	t / t
Description	Specific ingots consumption for billets production in the baseline scenario
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Calculated
Value of data (for ex ante calculations/determinations)	1,219
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by formula: $SC_{steel/billet,BL} = C_{steel,BL,y} / P_{billet,BL,y}$ $SC_{steel/billet,BL}$ - specific ingots consumption for billets production in the baseline scenario, t/t $C_{steel,BL,y}$ - ingots consumption for billets production in the baseline scenario, t/t $P_{billet,BL,y}$ - billets production from ingots in the baseline scenario, t Initial data are taken from Reports of costs in rolling plant #3 ChMK for 2002-2004.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	$SFC_{i,RP,BL,y}$
Data unit	thousand m^3 / t
Description	Specific natural gas consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario
Time of determination/monitoring	Determined ex ante

Source of data (to be) used	Calculated
Value of data (for ex ante calculations/determinations)	0,013
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by formula: $SFC_{i,RP,BL,y} = FC_{i,RP,BL,y} / C_{steel,RP,BL,y}$ $SFC_{i,RP,BL,y}$ - specific natural gas consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, thousand m^3 / t $FC_{i,RP,BL,y}$ - natural gas consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, thousand m^3 $C_{steel,RP,BL,y}$ - ingots consumption for billets production in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, t Initial data are taken from Reports of costs in rolling plant #3 ChMK for 2002-2003.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$SEC_{BOFP,BL}$**
Data unit	MWh / t
Description	Specific electricity consumption in oxygen-converter plant in the baseline scenario
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Calculated
Value of data (for ex ante calculations/determinations)	0,024

Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by formula: $SEC_{BOFP,BL} = EC_{BOFP,BL,y} / P_{steel,BOFP,BL,y}$ $SEC_{BOFP,BL}$ - specific electricity consumption in oxygen-converter plant in the baseline scenario, MWh / t $EC_{i,BOFP,BL,y}$ - electricity consumption in oxygen-converter plant in the baseline scenario, MWh $P_{steel,BOFP,BL,y}$ - steel production in oxygen-converter plant in the baseline scenario, t Initial data are taken from Reports of costs in oxygen-converter ChMK for 2002-2004.
QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	**$SEC_{RP,BL}$**
Data unit	MWh / t
Description	Specific electricity consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Calculated
Value of data (for ex ante calculations/determinations)	0,037
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by formula: $SEC_{RP,BL} = EC_{RP,BL,y} / C_{steel,RP,BL,y}$ $SEC_{RP,BL}$ - specific electricity consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, MWh / t $EC_{RP,BL,y}$ - electricity consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, MWh $C_{steel,RP,BL,y}$ - ingots consumption for billets production in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, t Initial data are taken from Reports of costs in rolling plant #3 ChMK for 2002-2003.

QA/QC procedures (to be) applied	-
Any comment	-

Data / parameter	$SOC_{RP,BL}$
Data unit	thousand m^3 / t
Description	specific oxygen consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario
Time of determination/monitoring	Determined ex ante
Source of data (to be) used	Calculated
Value of data (for ex ante calculations/determinations)	0,001
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculated by formula: $SOC_{RP,BL} = OC_{RP,BL,y} / C_{steel,RP,BL,y}$ $SOC_{RP,BL}$ - specific oxygen consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, thousand m^3 / t $OC_{RP,BL,y}$ - oxygen consumption in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, thousand m^3 $C_{steel,RP,BL,y}$ - ingots consumption for billets production in rolling plant #3 on mill 1250-3/CBM in the baseline scenario, t Initial data are taken from Reports of costs in rolling plant #3 ChMK for 2002-2003.
QA/QC procedures (to be) applied	-
Any comment	-