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:

"Fuel switch at Slavyansk Salt-Mining Company LLC, Ukraine"

The sectoral scopes:

(3) Energy demand; (8) Mining/mineral production.

The version number of the document: 3.0

The date of the document: 12th of June 2012

A.2. Description of the project:

Slavyansk Salt-Mining Company LLC (hereinafter referred to as "the plant") is the leading manufacturer of vacuum-evaporated salt of make "Extra" in Ukraine. Slavyansk Salt-Mining Company LLC was established at the beginning of 1999 on the basis of state enterprise "Salt Plant #2" which fell into decay and was mothballed within 6 years before due to wear-and-tear of equipment, depletion of raw material sources and economic downturn in the country. Since privatization, the manufacturing process at the plant has been rehabilitated, the market has been established and the plant has been operating in a stable way. With recognition of Kyoto Protocol and Joint Implementation mechanism, the plant acknowledged all benefits that could be achieved by introduction of emission reduction measures and decided to develop the project.

Project purpose

The project is aimed at reduction of greenhouse gas emissions into the atmosphere by switching to the fuels that have lower greenhouse potential, and through implementation of energy-efficiency modernization activities.

Situation before the project implementation

The salt manufacturing technology applied at Slavyansk Salt-Mining Company LLC required a large amount of thermal energy, mostly in the form of steam. Before the project implementation, all steam was generated by four boilers DKVR 10-13 operating on fuel oil. Further, the steam was conveyed from the boiler house to the manufacturing facilities through outworn and poorly insulated pipeline; a large amount of heat was lost during the transportation, especially in the cold period.

Technological line of salt extraction comprised outdated technology and aged equipment. Likewise, a considerable amount of thermal energy was lost, as heat of the salted condensate (waste product obtained during the salt evaporation process) was not utilized.

In summary, aggregate energy efficiency of heat generation, distribution and utilization at the enterprise was low. This resulted in increased steam demand, associated with increased fuel combustion and greenhouse gas emissions.

Baseline scenario

The baseline scenario for the project is considered to be the continuation of the existing practice of the plant operation. It is assumed that the plant will consume fuel oil for steam generation and will not run significant modernization measures in the absence of the incentives from the JI mechanism.

Project scenario

The proposed project includes implementation of two following core measures aimed at reducing greenhouse gas emissions into the atmosphere:

1) Switching steam generation to less carbon-intensive fuels. Fuel oil consumption was switched to natural gas and solid biomass (pellets of sunflower husks and sawdust). This activity included:

- Rehabilitation of previously mothballed boiler DE-25-14;
- Purchase and put into operation of new boiler DE-25-14;
- Modernization of existing boilers DKVR 10-13;

2) Improving energy-efficiency of the existing scheme of heat transmission and utilization to reduce steam consumption and fuel combustion. This activity included:

- Rehabilitation of steam pipeline;
- Implementation of scheme enabling to utilize heat of the salt condensate;
- Introduction of energy-efficiency measures at vacuum-evaporation section of the plant.

History of the project implementation, including the JI component

The decision on the project implementation was made on 27 September 2006 taking into account financial benefits provided by the JI mechanism. Revenues from sale of emission reduction units were considered crucial for the project.

As a part of the project activity, the plant has already implemented the following measures:

1. Switch from fuel oil consumption to natural gas and solid biomass (January 2008 – April 2010);
2. Reconstruction of steam pipeline (February 2010– April 2010);
3. Modernization of salt producing technological line (March 2010 - June 2010).

Due to the project implementation impact on the environment was significantly mitigated, including reduction of GHG emissions in the amount of approximately 214 000 tCO_2 equivalent (2008-2012).

A.3. Project participants:

Table 1 Project participants

Party involved	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (Host party)	• Slavyansk Salt-Mining Company LLC	No
The Netherlands	• Global Carbon B.V.	No

Slavyansk Salt-Mining Company LLC is a company where the JI project is carried out. Slavyansk Salt-Mining Company LLC is a manufacturer of highly purified salt “Extra”, which is marketed in Ukraine and neighbouring countries. It invests in the JI project implementation and will own ERUs generated.

Global Carbon B.V. is the developer of the project and a prospective buyer of the emission reduction units generated under the project. Global Carbon B.V. is a multinational organization established in 2004 with the head office in the Netherlands. The company is the leader among the developers of emission reduction and energy efficiency projects in the power sector, cement industry, metallurgical industry, renewable energy, coal mine methane and coal waste heaps in Ukraine, the Russian Federation and Bulgaria. Global-Carbon B.V. provides complete package of services related to JI mechanism starting from carbon audit of the possible project and finishing by provision of the brokerage services on emission reduction units.

A.4. Technical description of the project:

A.4.1. Location of the project:

A.4.1.1. Host Party(ies):

Ukraine

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

Donetsk Region

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

Slavyansk

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

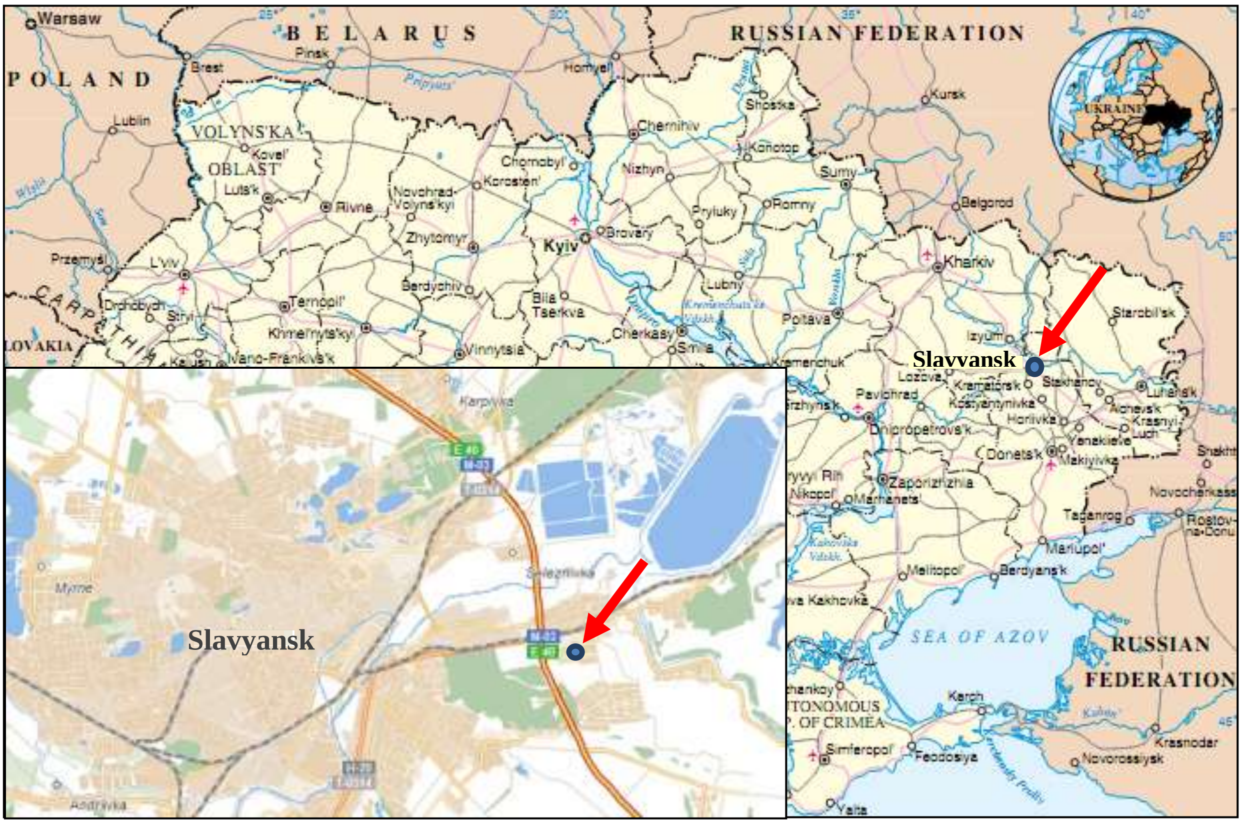

Figure 1 Map of Ukraine and location of the project site

Slavyansk Salt-Mining Company LLC is located in the town of Slavyansk that is situated in the north of Donetsk region. Slavyansk is one of the biggest traffic centers of Donetsk region and one of the most famous mud-cure health resorts in Ukraine. In 2010 the population of Slavyansk was 117 100 people. The distance from Slavyansk to the region center, Donetsk, is 119 km.

Geographic coordinates of the object: 37°40′34″ E and 48°50′54″ N

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

In Slavyansk minefield, salt occurs at the depth of more than 400 m below the surface, and it is extracted through the solution mining. Water is injected at high pressure through the well into the salt layer, where it dissolves the salt. Then the saturated salt brine containing about 310 g of NaCl per liter is pumped upwards to the salt-production facilities.

The produced salt brine contains not only NaCl, but also impurities of other salts, which can cause scaling of the evaporation units surface. Thereby before evaporation procedure the brine is being chemically purified from the scale-forming elements. Then the purified salt brine containing about 300 gram of NaCl and 5 gram of Na_2SO_4 per liter is transferred to the evaporation facilities.

The evaporation facilities consist of four vacuum evaporation batteries serving for evaporation of the purified salt brine to obtain concentrated salt pulp with high content of crystallized matter. The design of vacuum evaporation batteries is almost similar, varying only in evaporation pressure and connecting pipelines. Main units of the battery are heating chamber, separator and circulation pump. The heating chamber is a tube shell heat exchanger with heating surface of 250 m^2 serving for heating of the circulating brine. The separator serves for separation of vapour from liquid and for crystallization of salt from the boiling solution.

The vacuum evaporation battery operates in the following way: salt brine is boiling in the separator with crystallization of the table salt; boiled salt brine is pumped through the heating chamber where reheated to the boiling point and directed back to the separator. Then the cycle is repeated. The salt brine circulation process is maintained by circulation pumps.

Salt concentration in the brine is gradually increased by passing through the four evaporation batteries (please see the flowchart and the description below). After 1st battery the brine has approximately 20% concentration of salt in a solid phase; after the second – 30%; after the third – 45%; after the fourth – 55%. After evaporation of the salt brine and receiving salt pulp with around 55% share of salt in a solid phase, the pulp is additionally concentrated in clarification and settling tanks and supplied to the horizontal mixer where the fine salt is being separated. After separation, salt is being dried to the required moisture content, and stored as a final product; the settled salt brine from the upper layers of the salt pulp is directed from the settling tank to the brine storage tank.

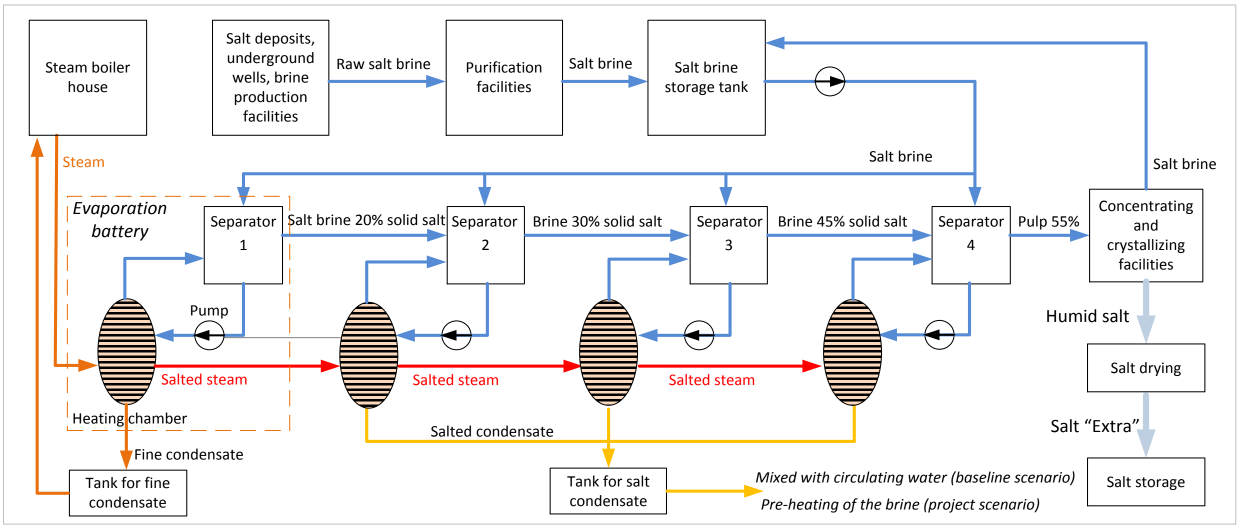

Figure 2 Simplified salt manufacturing process at Slavyansk Salt-Mining Company LLC

The first evaporation battery receives steam from the boiler house at 150 ºC; the steam passes through the heating chamber where exchanges heat with salt brine to enable the evaporation process. After the heating chamber, the steam is condensed and the generated fine condensate is directed back to the boiler house to produce steam. The heating chamber of the second battery receives salted steam of 90 ºC generated during boiling of the salt brine in the first evaporation unit; after heat exchanging, the steam condenses and the generated salt condensate flows to the salt condensate tank. Likewise, the third evaporation battery receives the salted steam of 76 ºC, the fourth – of 56 ºC. To reduce boiling point temperature of the brine, the evaporation is performed under the pressure lower than atmospheric. The first evaporation unit operates under positive pressure of +1 bar; the second unit operates under the vacuum -0.5 bar; the third and fourth units operate under the vacuum of -0.7 and -0.95 bar.

The applied technology of salt production requires large amount of steam used mainly for heating and evaporation of the salt brine. All steam produced in the steam boiler house of the plant is consumed for salt manufacturing purposes. Heating of the plant and drying of the salt are beyond the project boundaries and are maintained separately by other boilers.

Before the project implementation steam production at the plant was maintained by four steam boilers DKVR 10-13 designed for operation on fuel oil. Due to worn components and bad thermal insulation, the boilers consumed increased amount of fuel to produce useful steam for the plant's needs. Additional heat was spent for heating of fuel oil during cold periods. The generated steam was transferred through the old steam pipeline to the salt extraction facilities. The steam pipeline was in bad conditions because tubes were worn out, and poorly insulated, thereby high heat losses occurred during the steam transportation. In aggregate, the heat generation and distribution scheme at the plant was outdated and inefficient.

As well, steam consumption system of the plant, mainly presented by vacuum evaporation facilities, was not efficient. A considerable amount of thermal energy could be saved if the pressure in the evaporation batteries would be decreased, but the existing capacities could not provide its minimal level.

Evaporation process is followed by the generation of steam condensate having high temperature. Fine condensate, which was forming in evaporation battery #1, was directed to the steam boiler house for steam production purposes.

Salted condensate is similar to the fine condensate, but it contains minimal fraction of salt, and can't be used for steam production without purification. Previously to the project activities, technological scheme of the plant was designed in such a way that salted condensate was mixed with circulating water and used for underground solution of salt, and its thermal energy was wasted.

All this resulted in increased consumption of steam and increased combustion of fuel oil at the plant.

The baseline scenario was chosen as continuation of the business practice existing before the project implementation. It is considered that no substantial modernization would be carried out without the JI mechanism benefits.

The project scenario envisaged to decrease fuel consumption and greenhouse gas emissions into the atmosphere by use of next main activities:

1) Fuel switch: from carbon-intensive fuel oil to less carbon-intensive natural gas and climate-neutral solid biomass;
2) Reconstruction of the steam pipeline to reduce heat losses during the steam transportation;
3) Modernization of salt-producing facilities in order to increase efficiency of heat consumption.

Rehabilitation of old boiler DE-25-14

Before the project implementation, the plant applied 4 boilers DKVR 10-13 adopted for operation only on fuel oil. Also, there was a mothballed natural gas-fired boiler DE-25-14 removed from service due to physical wearing. In order to make the first step towards reduction of greenhouse gas emissions into the atmosphere, the plant decided to rehabilitate old boiler DE-25-14 and partially switch steam production from fuel oil to natural gas. The rehabilitation included repairment and replacement of worn components, inspection and reconstruction of auxiliary equipment (burners, heat exchanging components, and equipment for water preparation and steam distribution). Ultimately, the boiler was rehabilitated and put into operation in January 2008.

Installation of new boiler DE-25-14

The plant continued fuel switching program by implementing new boiler DE-25-14. The boiler was installed in the steam boiler house on a place of decommissioned old boiler DKVR 10-13. The new boiler DE-25-14 operates on natural gas and has the efficiency about 91%. The essential characteristics of the boiler are strong lining, increased productivity and efficiency, simplified thermal scheme, decreased auxiliary power and water consumption. The automatics of the boiler ensure its securable operation and efficiency. Auxiliary electrical equipment to the boiler is smoke exhauster, blow fan and supply pump.

The installation of the boiler DE-25-14 took place in October 2009. Since the implementation, two gas-fired boilers DE-25-14 generated sufficient steam for maintaining salt-production process. This allowed the plant completely cease the consumption of fuel oil for steam generation, reducing greenhouse gas emissions and saving thermal energy previously used for fuel oil reheating during cold periods.

Reconstruction of DKVR 10-13

The next step of the fuel switch program was modernization of boilers DKVR 10-13, which were outdated and designed for operation on fuel oil. The modernization included adjustment of the boilers for solid biomass combustion, and complete rehabilitation to increase energy efficiency. Within the reconstruction measures next activities were performed:

- The boilers were equipped with new efficient biomass burners and special biomass-adopted water economizers to utilize thermal energy of the flue gases;
- Biomass feeding equipment, and ash screens were installed;
- Heat-exchanging surface and convection bunch were replaced to new more efficient;
- Insulation of the boilers was reinforced with new refractory bricks lining;
- All worn and damaged components and auxiliary equipment were repaired and replaced;
- Water purification and preparation scheme was reconstructed;
- The battery cyclones were installed in order to maintain cleaning of the flue gases from chemical pollutants and solid particles.

The boilers DKVR 10-13 are equipped with special automatics system, which is responsible for operation, control, monitoring and protection. It is particularly important, as the technological line requires steam of reduced pressure and temperature.

Ultimately, three modernized boilers DKVR 10-13 operating on solid biomass were put into operation in April 2010. After this event, old boiler DE-25-14 ceased operation and has been kept in reserve.

Table 2 Steam boilers operating at the plant after the project implementation

Parameter	Unit	Value	
		DKVR 10-13	DE-25-14
Quantity	Pcs.	3	2
Fuels	Type	solid biomass	natural gas
Maximal steam production	t/h	10	25
Maximal steam temperature	ºC	194	194
Maximal steam pressure	bar	13	13
Heating surface of boiler	m^2	229.1	260.44
Heating surface of screen	m^2	47.9	808.2
Boiler capacity, water	m^3	9.04	16.5
Boiler capacity, steam	m^3	2.56	2.61
Boiler capacity, feed	m^3	1.36	-

Overall dimensions, LxWxH	mm	8850x5830x7100	10195x5315x6095

Switching to biomass combustion required not only modernization of boilers, but also development of the supporting infrastructure. The solid biomass storage, handling and transfer infrastructure developed at the plant includes:

1) Straddle truck loader HMT D 250. Serves for unloading packed pellets from a truck and supplying them to the measuring bunker;
2) Front truck loader UN053. Serves for supplying piped pellets to the measuring bunker;
3) Pneumatic transport facilities PTZ-25. Serves for transferring pellets from measuring bunker to the level-triggered supply bunker;
4) Pneumatic pipeline of 255 meters in length and 160 mm in diameter;
5) Level-triggered supply bunker 55 m^3. The bunker is equipped with low and high-level sensors to be maintain automatic refilling with pellets.
6) Screw conveyors for supplying pellets to the boilers;
7) Crushers DKU for preparation of the pellets;
8) Locking for dosing biomass supply to the boilers;
9) Air blower for supplying milled pellets to the boiler's nozzles.

Reconstruction of steam pipeline

The steam pipeline connecting steam boiler house and salt extraction facilities was worn and poorly insulated; thereby during the transportation, steam was losing a significant amount of thermal energy, especially during cold periods. The project activity included reconstruction of the pipeline through replacement of pipes by new ones with bigger diameter (to reduce the flow resistance), and sealing them with an efficient insulating material. Thereby the reconstructed pipeline enables the plant to transfer steam efficiently with minimal losses. Reconstruction of the pipeline was finished in April 2010, since then transmission loses of thermal energy have been minimized, saving a considerable amount of steam and consequently, combusted fuel.

Modernization of salt extraction facilities

The salt evaporation process includes generation of such waste product as salt condensate, which is a mixture of salt vapor and steam condensate, having temperature about 90 ºC. Previously, design of equipment and pipelines didn't allow utilizing heat of the salt condensate, and it was mixed with water and sent underground to the salt deposits to produce brine.

The plant introduced special heat exchanging scheme to utilize heat of the salt condensate. The measure consisted in reengineering of salted condensate flow pipelines, replacement of circulation pumps with more productive ones, installation of temperature sensors and heat exchanging facilities. Thus the flow direction of the salted condensate was changed and its waste heat replaced steam in pre-heating of the brine, previously performed using steam. Due to implementation of this measure, less steam is needed for salt production process, thus less fuel is combusted by the plant. The waste heat utilization scheme was implemented in June 2010.

Another measure of increasing the efficiency of steam utilization will be upgrade of the vacuum evaporation system. Previously, magnitude of vacuum in the evaporation units varied from 1 bar in the first unit to -0.9 bar in the fourth one. The temperatures of steam there were from 150 ºC to 55 ºC correspondingly. The project idea is to take under strong vacuum all 4 vacuum evaporation units to decrease brine boiling temperature, and hence decrease consumption of thermal energy. The modernization was commenced in October 2011 and is planned for implementation in April 2012 to bring additional reduction of fuel consumption.

Schedule of the project implementation is shown in a table below:

Table 3 Schedule of the project implementation

Activity	Start date	End date
Decision on the project implementation	September 2006	
Rehabilitation of the old boiler DE-25-14	November 2007	January 2008
Implementation of new boiler DE-25-14	July 2008	October 2009
Modernization of the boilers DKVR 10-13 for operation on solid biomass	December 2008	April 2010
Reconstruction of the steam pipeline	February 2010	April 2010
Implementation of utilization scheme of salted condensate thermal energy	April 2010	June 2010
Modernization of vacuum evaporation batteries	October 2011	April 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:

The proposed JI project is aimed at reduction of greenhouse gas emissions by switching to less carbon intensive fuel and decreasing fuel consumption by implementing energy efficiency measures.

Prior to the project implementation, the plant produced salt consuming a lot of fuel oil, which is carbon-intensive fossil fuel. Four boilers DKVR 10-13 operating on fuel oil generated steam mainly used for heating and evaporation purposes. The produced steam was transferred to the manufacturing facilities through the outdated pipeline, where high thermal energy losses occurred.

Within the project activity, the plant implemented measures aimed at reduction of greenhouse gas emissions:

- Switching from fuel oil to natural gas and solid biomass, which are less carbon-intensive fuels;
- Reconstruction of the steam pipeline to decrease transmission losses of thermal energy;
- Modernization of salt-producing facilities to improve heat consumption scheme.

Greenhouse gas emission reduction will be achieved by the project by decreasing fuel consumption and switching to less carbon-intensive fuels.

The emission reductions would not occur in the absence of the proposed project, because modernization required significant investment and was financially unattractive for the project owner. For more detail please see Section B.

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

Table 4 Estimated amount of emission reductions over the period 2008-2012

	Years
Length of the crediting period	5
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
Year 2008	9 083
Year 2009	29 143
Year 2010	55 568

Year 2011	58 900
Year 2012	59 814
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	212 508
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	42 502

Table 5 Estimated amount of emission reductions over the period 2013-2019

	Years
Length of the crediting period	7
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
Year 2013	59 814
Year 2014	59 814
Year 2015	59 814
Year 2016	59 814
Year 2017	59 814
Year 2018	59 814
Year 2019	59 814
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	418 698
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	59 814

A.5. Project approval by the Parties involved:

The project has been officially presented for endorsement to the Ukrainian authorities. With regard to the Netherlands' legislation, no LoE from the Netherlands is needed.

After AIE has completed the determination report, the PDD and the Determination Report will be presented to the State Environmental Investment Agency of Ukraine to obtain a Letter of Approval from Ukraine. LoA from the Netherlands will be obtained after publication of PDD on www.ji.unfccc.int.

SECTION B. Baseline

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

A baseline for the JI project has to be set in accordance with Appendix B to decision 9/CMP.1 (JI guidelines)[1], and with further guidance on baseline setting and monitoring developed by the Joint Implementation Supervisory Committee (JISC). In accordance with the "Guidance on Criteria for Baseline Setting and Monitoring" version 03[2] (hereinafter referred to as Guidance), the baseline for a JI project is the scenario that reasonably represents the anthropogenic emissions by sources or anthropogenic removals by sinks of GHGs that would **occur in the absence of the proposed project**. In accordance with the Paragraph 9 of the Guidance the project participants may select either: an approach for baseline setting and monitoring developed in accordance with appendix B of the JI guidelines (JI specific approach); or a methodology for baseline setting and monitoring approved by the Executive Board of the clean development mechanism (CDM), including methodologies for small-scale project activities, as appropriate, in accordance with paragraph 4(a) of decision 10/CMP.1, as well as methodologies for afforestation/reforestation project activities. Paragraph 11 of the Guidance allows project participants that select a JI specific approach to use selected elements or combinations of approved CDM baseline and monitoring methodologies or approved CDM methodological tools, as appropriate.

Description and justification of the baseline chosen is provided below in accordance with the "Guidelines for users of the Joint Implementation Project Design Document Form", version 04[3], using the following step-wise approach:

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

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

- An approach for baseline setting and monitoring developed in accordance with appendix B of the JI guidelines (JI specific approach).

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

The baseline for this project shall be established in accordance with appendix B of the JI guidelines. Furthermore, the baseline shall be identified by listing and describing plausible future scenarios on the basis of conservative assumptions and selecting the most plausible one.

The most plausible future scenario will be identified by performing a barrier analysis. Should only two alternatives remain, of which one alternative should represent the project scenario with the JI incentive, the CDM Tool "Tool for the demonstration and assessment of additionality" shall be used to prove that the project scenario cannot be regarded at the most plausible one. Key factors that affect the baseline such as sectoral reform policies and legislation, economic situation/growth and socio-demographic factors in the relevant sector as well as resulting predicted demand, suppressed and/or increasing demand that will be met by the project, availability of capital, local availability of technologies/techniques, skills and know-how and availability of best available technologies/techniques in the future, fuel prices and availability, national and/or subnational expansion plans for the energy sector, will be taken into account while formulating the plausible feature scenarios.

[1] http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=2

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

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

Step 2. Application of the approach chosen

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

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

Scenario 1. Continuation of the existing situation

In the current situation Slavyansk Salt-Mining Company LLC produces salt by use of existing equipment and technology. The manufacturing cycle and existing equipment are not subjected to substantial modernization activities and don't provide considerable saves in energy consumption. The old pipeline system operates without rehabilitation causing high heat loses during the steam transportation. As the burners of existing boilers DKVR 10-13 are designed for operation only on fuel oil, the plant continues to utilize this carbon-intensive fuel. In this scenario, level of greenhouse gas emissions at the plant remains constant as the emissions are not mitigated.

Scenario 2. Implementation of modernization activities (the proposed project without JI benefits)

In this scenario, the plant implements several measures aimed at increasing energy-efficiency and decreasing greenhouse gas emissions. Firstly, the plant introduces natural gas boilers, switching part of the steam production from fuel oil to natural gas. Secondly, existing steam boilers DKVR 10-13 are reconstructed for operation on biomass. Thirdly, steam pipeline is rehabilitated. And fourthly, existing technologies of salt production and steam utilization undergo modernization enabling to save a significant amount of thermal energy. Thus the amount of greenhouse gas emissions into the atmosphere under this scenario is considerably lower than in the previous one.

Scenario 3. Reconstruction of only steam pipeline without other modernization activities

In this scenario, the plant would initiate reconstruction of only steam pipeline. Steam boilers and equipment for salt production remain without modernization or reconstruction and are only subjected to regular maintenance. The pipeline reconstruction would allow plant prevent heat loses, save a big amount of thermal energy and consequently reduce consumption of fossil fuels. However, implementation of only this one activity would not provide that considerable effect of emission reductions, which could be obtained by realization of the whole complex of project measures. In addition the scenario faces financial barriers due to high cost of the pipeline reconstruction.

Scenario 4. Switching from fuel oil to natural gas and biomass without other modernization activities

In this scenario, steam pipeline and equipment for salt production remain without modernization or reconstruction and are only subjected to regular maintenance. The plant would carried out only switching from fuel oil to natural gas and biomass consumption. This measure would allow the plant reduce emissions of greenhouse gases into the atmosphere by switching to less carbon-intensive fuel. However, implementation of only this one activity would not provide that considerable effect of emission reductions, which could be obtained by realization of the whole complex of project measures. In addition the scenario faces financial barriers due to high cost of the new boiler and reconstruction of the old boilers from fuel oil to biomass.

Scenario 5. Modernization of salt producing equipment without other reconstruction or modernization activities

In this scenario, the plant would implement modernization of the salt producing equipment is order to increase efficiency of energy consumption. The modernized equipment allow the plant reduce fuel consumption and greenhouse gas emissions, however, implementation of only this one activity would not provide that considerable effect of emission reductions, which could be obtained by realization of the whole complex of project measures. In addition the scenario faces financial barriers due to high cost of the modernization.

Scenario 6. Installation of new coal-fired boilers for steam generation

In this scenario, the plant would cease exploitation of existing fuel oil boilers and purchase and install new coal-fired boilers, designated for steam generation. New boiler house are erected to accommodate the boilers. The boiler house are located adjacent to the shop in order to minimize transmission heat loses. With this measure, the plant will obtain sufficient steam for salt production process. Greenhouse gas emissions, associated with this scenario, will be high due to combustion of such carbon-intensive fuel as coal.

Sub step 2b. Barrier analysis

Scenario 1. Continuation of the existing situation

This scenario does not anticipate any activities and therefore does not face any barriers.

Scenario 2. Implementation of modernization activities (the proposed project without JI benefits)

Investment barrier: This scenario is financially unattractive and faces barriers. Please refer to section B.2 for details.

Scenario 3, Scenario 4 and Scenario 5

Investment barrier: These scenarios imply that the plant implements one of the energy efficiency or fuel switch measures separately, without introducing the others. Here, the plant would be able to increase overall energy-efficiency of the manufacturing process, or switch to less carbon-intensive fuels, however should such activities as reconstruction of the steam pipeline, switching from fuel oil to natural gas and biomass or modernization of salt producing equipment be implemented separately, the plant would neither receive considerable reduction in energy consumption, nor generate sufficient amount of emission reduction units to develop the project as a JI one. Taking into account high implementation cost of the mentioned activities, and reduced energy efficiency and emission reduction effects in case of the separate implementation, the Scenarios 3, 4 and 5 face financial barriers.

Scenario 6. Installation of new coal-fired boilers for steam generation

Investment barrier: Installation of new coal-fired boilers requires significant capital investment into equipment purchase, and building, projecting, mounting and commissioning works. Additionally all communications and pipelines shall be installed from the very beginning. Comparing to the others scenarios, this one requires the most investments and moreover causes higher GHG emissions, thereby, it is unfavourable for implementation

Sub step 2c. Baseline identification

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

This baseline scenario has been established according to the criteria outlined in the "Guidance on Criteria for Baseline Setting and Monitoring" version 03:

1) On a project specific basis;
2) In a transparent manner with regard to the choice of approaches, assumptions, methodologies, parameters, data sources and key factors. All parameters and data are either monitored by the project participants or are taken from sources that provide a verifiable reference for each parameter. Project participants use approaches suggested by the Guidance and methodological tools provided by the CDM Executive Board;
3) Taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector. It is demonstrated by the above analysis that the baseline chosen clearly represents the most probable future scenario given the circumstances of modern day Ukraine industry sector;
4) In such a way that emission reduction units (ERUs) cannot be earned for decreases in activity levels outside the project activity or due to force majeure. According to the proposed approach emission reductions will be earned only when project activity will generate salt production, so no emission reductions can be earned due to any changes outside the project activity.
5) Taking account of uncertainties and using conservative assumptions. A number of steps have been taken in order to account for uncertainties and safeguard conservativeness:
    a. Lower range of parameters is used for calculation of baseline emissions and higher range of parameters is used for calculation of project activity emissions;
    b. Default values were used to the extent possible in order to reduce uncertainty and provide conservative data for emission calculations.

Key factors that affect the Project and the baseline are taken into account:

1) **Sectoral reform policies and legislation.** State program of industry development until 2017[4] foresees three stages of development:
    a) During the first stage (2009-2012) maximal employment of existing capacities and their modernization is to be performed. Manufacturing of new competitive production is to be mastered; innovative activities have to be developed. Organization and management of the enterprises is to be improved;
    b) The second stage (2013-2015) implies that the key factor of development will be implementation of state-of-the-art manufacturing capacities, namely scientific-intensive ones. Range of competitive products is to be enhanced;
    c) Further development of the industrial field is anticipated during the third stage (2016-2017);

    However, it is supposed that enterprises finance those improvements from their own funds or bank loans, which practically means that Ukrainian government is not intervening in this process and execution of the Program fully depends on market conditions and availability of financial resources. In case of existence of any incitements in accordance with this program, they could alleviate the barriers, which prevent the proposed project realization. Nevertheless, no definite mechanisms for stimulation were developed. Therefore, plants in Ukraine have no obligations to implement any energy efficient measures. Taking into account the above mentioned it is reckoned that no policies and legislation can influence the baseline;

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[4] http://industry.kmu.gov.ua/control/uk/publish/article?art_id=57967&cat_id=57966

2) **Economic situation/growth and socio-demographic factors in the relevant sector as well as resulting predicted demand.** The market of table salt and the types of products are standardized. Amount of manufacturing goods depends on demand level and management and marketing activities of the plant. It is assumed that the level of production and demand of the plant is not influenced by the project. Thereby, suppressed and/or increased demand that will be met by the project can be considered in the baseline as appropriate (e.g. by assuming that the same level of service as in the project scenario would be offered in the baseline scenario).

3) **Availability of capital (including investment barriers).** Ukraine has been always considered a high-risk country for investments and doing business. Table below summarizes key indicators of business practices in Ukraine.

Table 6 International ratings of Ukraine[5]

Indicators	2006	2007	2008	2009	Note
Corruption index of Transparency International	99 position from 163	118 position from 180	134 position from 180	-	Index of corruption
Rating of business practices of The World Bank (The Doing Business)	124 position from 155	118 position from 179	139 position from 178	145 position from 181	Rating of conduct of business (ease of company opening, licensing, staff employment, registration of ownership, receipt of credit, defense of interests of investors)
The IMD World Competitiveness Yearbook	46 position from 55	46 position from 55	54 position from 55	56 position from 57	Research of competitiveness (state of economy, efficiency of government, business efficiency and state of infrastructure)
Index of Economic Freedom of Heritage Foundation	99 position from 157	125 position from 161	133 position from 157	152 position from 179	Determination of degrees of freedom of economy (business, auction, financial, monetary, investment, financial, labor freedom, freedom from Government, from a corruption, protection of ownership rights)
Global Competitiveness Index of World Economic Forum	69 position from 125	73 position from 131	72 position from 134	-	Competitiveness (quality of institutes, infrastructure, macroeconomic stability, education, development of financial market, technological level, innovative potential)

Risks of doing business in Ukraine significantly impact the availability of capital in the country. Commercial loan rates in EURO in Ukraine for the period of over 5 years fluctuated in March – October 2010 between 8% and 10.4% according to the official statistics of the National Bank of Ukraine[6]. For the reference similar rates in Germany for this period fluctuated between 2.3% to

[5] Data by the State Agency of Ukraine for Investments and Innovations

[6] Statistical Release. Interest Rates. March 2011 http://www.bank.gov.ua/files/4-Financial_markets(4.1).xls

3.6% according to the European Central Bank[7]. Cost of debt financing in Ukraine is at least twice as high than in the Eurozone. The risks of investing into Ukraine are additionally confirmed by the country ratings provided by the Moody's international rating agency and the associated country risk premium. The table below compares country risk premiums for Russia and Ukraine[8]:

Table 7 Country risk premiums for Russia and Ukraine

Total Risk Premium, %	2008	2009	2010
Russia	6.52	8	6.9
Ukraine	10.04	14.75	12.75

As it is demonstrated by this table, Russia, while offering a comparable set of investment opportunities, is a significantly less risky country for investing in than Ukraine. High interest rates and shortness of the resources of financial institutions make it hard to finance any big infrastructure projects. Such projects are looking upon direct public financing or partnerships between private investors, international financial organizations and government. Large scale privately financed infrastructure projects in Ukraine are hard to come by.

4) **Local availability of technologies/techniques, skills and know-how and availability of the best available technologies/techniques in the future.** Due to global market, up-to-date technologies from developed countries are available for purchase, however their cost is high and implementation requires existence of knowledgeable personnel able to introduce and operate the equipment. Currently, lack of investments and lack of modern technologies application experience in Ukraine impede possible modernization projects and further progress of the industry sector.

5) **Fuel prices and availability.** Electricity and natural gas are widely used in Ukrainian industry. Natural gas is mostly imported from the Russian Federation. Prices for gas consumers are regulated by National Electricity Regulatory Commission, which has a special department for cost and prices monitoring by size of demand and categories of consumers. Electric energy in Ukraine is produced mainly by fossil fuel fired thermal power stations and nuclear power stations. Wholesale Electricity Market of Ukraine managed by state enterprise Energorynok is responsible for marketing of electric energy. Price for electric energy ranges in a large extent for different types of consumers.

Baseline Emissions

As stated in the "Guidance on Criteria for Baseline Setting and Monitoring" version 03 the indicators, constants, variables and/or models used shall be reliable (i.e. provide consistent and accurate values) and valid (i.e. be clearly connected with the effect to be measured), and shall provide a transparent picture of the emission reductions or to be monitored. Default values may be used, as appropriate. In the selection of default values, accuracy and reasonableness shall be carefully balanced. The default values chosen should originate from recognized sources, be supported by statistical analyses providing reasonable confidence levels and be presented in a transparent manner.

Next parameter, applied for calculation of the baseline scenario emissions, has been set ex-ante:

- $SHC_{Fuel\_oil,BL}$ - Specific consumption of thermal energy for salt production in the baseline scenario

The value of this parameter has been calculated in a transparent manner using the corresponding historical data from technical reports of the plant and technical characteristics of equipment used. The accuracy is ensured by analyzing the values for the period of 36 months (3 years) prior to the project

[7] Germany, Harmonised long-term interest rates for convergence assessment purposes http://www.ecb.europa.eu/stats/money/long/html/index.en.html

[8] Data from Aswath Damodaran, Ph.D., Stern School of Business NYU http://pages.stern.nyu.edu/~adamodar/

implementation and extracting the weighted average value. The 3 year period is sufficient to reflect and equalize the operational fluctuations and deviations which occur in the manufacturing process, thus the default value has been estimated with a high level of confidence.

In order to calculate baseline emissions following assumptions were made:

1) The salt produced within the project scenario displaces the same amount of the same type of salt that would be produced in the baseline scenario;
2) The proposed project will not influence the salt production level;
3) The only sources of thermal energy used for salt production are the described boilers DKVR 10-13 and DE 25-14. No other sources will be used. All steam generated by the boilers DKVR 10-13 and DE 25-14 is used for salt production purposes;
4) Power consumption for steam production and technological cycle of salt production will be equal in the baseline and project scenario; power consumption for biomass preparation and handling will be calculated separately;
5) Climate-neutral biomass will be used in the project scenario, thus no greenhouse gases will be emitted during its combustion in the boilers.

Baseline emissions come from one major source:

- Carbon dioxide emissions that occur during combustion of fuel oil for generation of steam used for salt production.

Emissions in the baseline scenario are calculated as follows:

$$BE_y = SHC_{Salt,BL} \cdot P_{Salt,PJ,y} \cdot EF_{CO2,Fuel\_oily} \quad \text{(Equation B-1)}$$

Where:

BE_y – Baseline emissions in year *y*, [tCO_2e];
$P_{Salt,PJ,y}$ – Quantity of salt produced in the project scenario in year *y*, [t];
$SHC_{Salt,BL}$ – Specific consumption of thermal energy for salt production in the baseline scenario, [GJ/t];
$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ].

Carbon dioxide emission factor for fuel oil combustion is calculated as follows:

$$EF_{CO2,Fuel\_oil,y} = \frac{OXID_{Fuel\_oil,y} \cdot k^{C}_{Fuel\_oil,y} \cdot 44/12}{1000} \quad \text{(Equation B-2)}$$

Where:

$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ];
$OXID_{Fuel\_oil,y}$ – Carbon oxidation factor of fuel oil in year *y*, [ratio];
$k^{C}_{Fuel\_oil,y}$ – Carbon content of fuel oil in year *y*, [tC/TJ];
44/12 – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2;
1/1000 – Conversion factor from GJ into TJ.

Leakage

No significant leakages will occur during the project implementation. Please see Section B.3. for description of leakages in detail.

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

Table 8 List of data used to establish the baseline emissions

Data/Parameter	$SHC_{Fuel\_oil,BL}$
Data unit	GJ/t
Description	Specific consumption of thermal energy for salt production in the baseline scenario
Time of determination/monitoring	Fixed ex-ante
Source of data (to be) used	Statistical data from the plant
Value of data applied (for ex ante calculations/determinations)	7.296
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This data is calculated based on actual records obtained for three years before the project implementation. This value is the specific heat consumption for salt production for the period 2005-2007.
QA/QC procedures (to be) applied	According to the policy of the plant
Any comment	Please see Annex 2 for details

Data/Parameter	$P_{Salt,PJ,y}$
Data unit	t
Description	Quantity of salt produced in the project scenario in year *y*
Time of determination/monitoring	On an annual basis
Source of data (to be) used	Technical reports of the plant
Value of data applied (for ex ante calculations/determinations)	Set ex-post during monitoring
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Data from the electronic scales at the packing line
QA/QC procedures (to be) applied	According to the policy of the plant
Any comment	

Data/Parameter	$OXID_{Fuel\_oil,y}$
Data unit	ratio
Description	Carbon oxidation factor of fuel oil in year *y*
Time of determination/monitoring	On an annual basis
Source of data (to be) used	National Inventory Report of Ukraine
Value of data applied (for ex ante calculations/determinations)	Set ex-post during monitoring
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Country-specific data is presented in National Inventory Reports of Ukraine
QA/QC procedures (to be) applied	Data from the most recent National Inventory Report of Ukraine will be applied

Any comment	

Data/Parameter	$k^{C}_{Fuel\_oil,y}$
Data unit	tC/TJ
Description	Carbon content of fuel oil in year *y*
Time of determination/monitoring	On an annual basis
Source of data (to be) used	National Inventory Report of Ukraine
Value of data applied (for ex ante calculations/determinations)	Set ex-post during monitoring
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Country-specific data is presented in National Inventory Reports of Ukraine
QA/QC procedures (to be) applied	Data from the most recent National Inventory Report of Ukraine will be applied
Any comment	

B.2. Description of how the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the JI project:

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

Step 1. Indication and description of the approach applied

As suggested by Paragraph 44 (c) of the "Guidance on Criteria for Baseline Setting and Monitoring" version 03: Application of the most recent version of the "Tool for the demonstration and assessment of additionality" approved by the CDM Executive Board (allowing for a grace period of eight months when the PDD is submitted for publication on the UNFCCC JI website), or any other method for proving additionality approved by the CDM Executive Board. The additionality of the Project has been demonstrated using the "Tool for the demonstration and assessment of additionality" version 05.2.1[9].

Step 2. Application of the approach chosen

The following steps are taken as per "Tool for the demonstration and assessment of additionality" version 05.2.1

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

We will define realistic and credible alternatives to the project activity through the following Sub-steps:

Sub-step 1a: Define alternatives to the project activity

The following alternatives to the proposed project were identified:

Alternative 1. Implementation of modernization activities (the proposed project without JI benefits)

This scenario is similar to the project activity, only in this case, the project is not benefiting from the possible development as a joint implementation project. In this scenario the plant has introduced energy-efficiency measures and fuel switch from fuel oil to natural gas and biomass aimed at carbon dioxide

[9] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.1.pdf

emission reduction and decrease in energy consumption. Hereby, less fossil fuel is combusted in order to produce steam that is used in manufacturing cycle of salt production.

Alternative 2. Continuation of the existing situation

In this scenario, Slavyansk Salt-Mining Company LLC produces salt by use of existing equipment and technology. The manufacturing cycle and existing equipment are not subjected to substantial modernization activities and don't provide considerable saves in energy consumption. The old pipeline system operates without rehabilitation causing high heat loses during the steam transportation. As the burners of existing boilers DKVR 10-13 are designed for operation only on fuel oil, the plant continues to utilize this carbon-intensive fuel. In this scenario, level of greenhouse gas emissions at the plant remains constant as the emissions are not mitigated.

Outcome of Step 1a: We have identified realistic and credible alternative scenarios to the project activity.

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

There is no any sectoral legislative factor that would oblige the plant to carry out any change in the business-as-usual-operations, as:

- The equipment is workable without modernization activities;
- The facilities of the plant comply with the current regulations and no relevant development in legislation within the Host Country is foreseen for the next years;
- No environmental issues are associated with the continuation of the current operations.

The identified alternatives do not contradict existing laws and regulations taking into consideration the enforcement of such in Ukraine.

Outcome of Step 1b: We have identified realistic and credible alternative scenarios to the project activities that are in compliance with mandatory legislation and regulations taking into account the enforcement in Ukraine.

Step 2. Investment Analysis

The purpose of the investment analysis in the context of additionality is to determine whether the proposed project activity is not:

a) The most economically or financially attractive; or
b) Economically or financially feasible, without the revenue from the sale of emission reductions.

Sub-step 2a: Determine appropriate analysis method

There are three methods applicable for an investment analysis: simple cost analysis, investment comparison analysis and benchmark analysis.

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

An investment comparison analysis (Option II) compares suitable financial indicators for realistic and credible investment alternatives. As only plausible alternative represents the continuation of the existing situation, a benchmark analysis (Option III) is applied.

Sub-step 2b: Option III. Apply benchmark analysis

The proposed project, which is fuel switch and implementation of energy-efficiency measures, is implemented by Slavyansk Salt-Mining Company LLC. For the benchmark analysis of the project the indicator of Net Present Value (NPV) was used. The goal of analysis will be to show that the project activity not undertaken as a joint implementation project will not be financially attractive and will lead to negative value of NPV. This benchmark has been selected for a number of reasons:

1. The project owner does not have formalized internal benchmark that is systematically applied during project evaluation;
2. No governmental approved benchmark is available for projects of this kind in Ukraine;
3. Positive/negative NPV is a generally accepted project evaluation benchmark. Its use is encouraged by many project finance professionals, while IRR is considered to be controversial and is not recommended as the single benchmark for project evaluation[10].

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

The financial analysis refers to the time of investment decision-making. The data provided by the project participant were used to perform calculations.

The following assumptions were used for the calculation of cashflows and indicators:

1) Investment decision date is taken as 27 September, 2006. Prices, tariffs and costs for the analysis are taken as of that date;
2) The calculation has been made for a period of 12 years;
3) All calculations were done in an international currency – EUR.

As an appropriate discount rate for the NPV calculation in this case the cost of equity was used. The discount rate is set at a level of 13.00% for the NPV calculation and represents the weighted average cost of capital for the project. As the benchmark is based on parameters that are standard in the market, and the information on typical debt/equity finance structure observed in the sector of the country is not readily available, 50% debt and 50% equity financing is assumed as a default. The project cash-flow modelling has been performed in order to calculate project's indicator and compare it with the benchmark.

The table below demonstrates financial indicator calculated for the project activity.

Table 9 Financial indicators

Project activity	***NPV, EUR thousand***
Fuel switch and implementation of energy-efficiency measures at the plant	-1 596

As it can be seen from the table the possible project activity results in negative NPV under current conservative discount rate. This means that any investor wishing to invest into such project will lose value of his investment instead of increasing it. Hence, the project cannot be considered as a financially attractive course of action.

Sub-step 2d: Sensitivity analysis

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

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[10] *Principles of Corporate Finance* 7th edition, Richard A. Brealey, Stewart C. Myers, McGraw-Hill Higher Education, 2003 – p. 105

version 05.2.1. As suggested in the "Guidance on the Assessment of Investment Analysis" version 05[11] referred to in this Tool, variations of the key factors in the sensitivity analysis should cover at least the range of +10% and –10%.

The following four key indicators were considered in the sensitivity analysis: investment cost, fuel oil price, natural gas price, biomass pellet price. The other cost components and factors account for less than 10 % of total project costs or total project revenues and therefore are not considered in the sensitivity analysis.

The following scenarios were proposed in order to explore the sensitivity of the analysis results.

Scenario 1 considers a 10% increase of investment cost and all significant cost components.

Scenario 2 is based on the assumption of a 10% investment cost decrease.

Scenario 3 implies fuel oil, natural gas and biomass pellet price increase by 10%.

Scenario 4 implies fuel oil, natural gas and biomass pellet price decrease by 10%.

Results of the analysis are provided a table below.

Table 10 Sensitivity analysis

Scenario	***NPV, EUR thousand***
Base Case	-1 596
Scenario 1 (Investment cost +10%)	-2 967
Scenario 2 (Investment cost -10%)	-225
Scenario 3 (Fuel oil, natural gas and biomass pellet price +10%)	-236
Scenario 4 (Fuel oil, natural gas and biomass pellet price -10%)	-2 955

As we can see from the table, the project does not reach positive NPV under any of the varying assumptions. Thus, the sensitivity analysis results presented above demonstrate the robustness of conclusions made in sub-step 2c. It can be concluded that project activity is unlikely to be financially/economically attractive.

Outcome of Step 2: After the sensitivity analysis it is concluded that the proposed JI project activity is unlikely to be financially/economically attractive.

Step 3: Barrier analysis

Not applied.

Step 4: Common practice analysis

Sub-step 4a: Analyse other activities similar to the proposed project activity:

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

There are several cases of biomass application in Ukraine which should be discussed to assess the additionality of the Project:

1) Biomass application for heating and hot water supply of buildings: Ukraine possesses wide resource base, and combustible biomass is available in the shape of firewood, sawdust, straw, sunflower husks, pellets etc. Consequently, there is sufficient market proposition on low-medium capacity boilers allowing generation of enough thermal energy for heating and hot water supply of small-medium consumers. Occasionally, heat boiler houses in Ukraine are switched from fossil fuel to biomass, and owners of households opt for applying biomass instead of the wide spread natural gas.
2) Biomass application for heat and power supply: Ukraine is a large producer of sunflower oil and wood-particle boards. These industries generate a big amount of sunflower husks and sawdust which are a waste product. Until adoption of Kyoto Protocol, common practice was storing sunflower husks and sawdust at landfills. After recognition of JI mechanism, several JI projects on utilization of combustible biomass wastes for heat and power generation have been developed:
    - Utilization of Biomass for Steam and Power Supply at Peresechansk Sunflower Oil Extraction Mill[12];
    - Utilization of Sunflower Seeds Husk for Steam and Power Production at the Oil Extraction Plant OJSC "Kirovogradoliya"[13]
    - Utilization of Waste Wood for Steam Production at Wood-working and Fibreboard Plant “Uniplyt” Ltd.[14]

Sub-step 4b: Discuss any similar Options that are occurring:

It is required to follow Sub-step 4b according to of the Tool when this project is widely observed and commonly carried out. The proposed JI project does not represent a widely observed practice in the area considered:

The option *1)* of the *Sub-step 4a* is not similar to the proposed project because the project is reconstruction of high-capacity boilers for industrial application, not for heating and hot water production purposes.

The option *2)* of the *Sub-step 4a* is not similar to the proposed project because the indicated projects apply on-site produced biomass for heat and power generation, however the proposed project does not possess own resource base, and does not use biomass for power generation. Moreover the indicated projects are implemented as JI projects and, therefore, are excluded from the analysis.

Industrial thermal energy generating capacities in Ukraine are predominantly represented by boilers operating on fossil fuels: natural gas, coal and fuel oil. Although Ukraine possesses a large resource base for production of combustible biomass and biomass pellets, the technology is not wide spread yet due to numerous barriers:

1) Limited manufacturing of high-capacity biomass boilers in Ukraine;
2) Low variation of technological parameters of boilers and difficulty in adjusting a boiler with a certain manufacturing cycle;

[12] http://ji.unfccc.int/JIITLProject/DB/M6A1UW7EW14J4KJZ3GZ84GHSG91WJB/details

[13] http://ji.unfccc.int/JIITLProject/DB/721YYVG1S3PMXJ8LT4BLAN5796NQEU/details

[14] http://ji.unfccc.int/JIITLProject/DB/PEYLWVMEDN2WMV875CW1VPN13Z2LYR/details

3) Difficult process of reconstructing fossil fuel boilers for biomass combustion;
4) Low recognition and confidence in technology among entrepreneurs;
5) Absence of maintenance experience or absence of necessary funds;
6) Necessity of obtaining a big number of associated permissions and approvals for implementation
7) Technological barriers associated with difficult biomass combustion process

All these barriers interfere growing of biomass sector and industrial application of biomass boilers in Ukraine, leaving the biomass far behind fossil fuels in production of thermal energy for industrial purposes. Thereby the facts mentioned above allow concluding that the proposed JI project is not common practice in Ukraine.

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

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

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

The project activities are physically limited to territory of Slavyansk Salt-Mining Company LLC. At the same time, some sources of GHG emissions are indirect – carbon dioxide emissions due to the consumption of power from the Ukrainian electricity grid, as a result of electricity generation using fossil fuels.

Next objects are included in the project boundaries: steam boilers DKVR 10-13 and DE-25-14; steam pipeline; salt producing equipment; equipment for biomass preparation and handling.

It should be noted, that all steam produced by the boilers DKVR 10-13 and DE-25-14 is applied for salt production purposes, and no other sources of thermal energy are applied.

Sources of emissions in the baseline scenario will be boilers DKVR 10-13 which will combust fuel oil for steam generation used for salt production.

Sources of emissions in the project scenario will be:

1) Boilers DKVR 10-13 which will combust fuel oil for steam generation used for salt production;
2) Boilers DE-25-14 which will combust natural gas for steam generation used for salt production;
3) Equipment for biomass preparation and handling that will consume power from the Ukrainian grid.

It is conservatively assumed that the amount of power consumed by the boilers and salt manufacturing technological line will be equal in the baseline and project scenario.

The table below shows an overview of all emission sources in the baseline and project scenarios. Project boundary has been delineated in accordance with provisions of Paragraphs 14 and 16 of the Guidance.

Table 11 Sources of emissions in the baseline and project scenarios

	Source	Gas	Included/Excluded	Justification / Explanation
Baseline scenario	Fuel oil combustion	CO_2	Included	Main emission source
	Electricity consumption for boiler operation and salt production	CO_2	Excluded	Excluded for simplification. Conservatively assumed that the

				consumption will be equal to that of the project scenario.
Project scenario	Fuel oil combustion	CO_2	Included	Main emission source
	Natural gas combustion	CO_2	Included	Main emission source
	Biomass combustion	CO_2	Excluded	It is assumed that climate-neutral biomass fuel will be used. Thus, no GHG emissions will be generated during its combustion.
	Electricity consumption for biomass preparation and handling	CO_2	Included	Main emission source
	Electricity consumption for boiler operation and salt production	CO_2	Excluded	Excluded for simplification. Conservatively assumed that the consumption will be equal to that of the baseline scenario.

Baseline scenario

The baseline scenario is the continuation of the existing situation. Steam boilers DKVR 10-13 operate on fuel oil and supply steam to the salt extracting facilities. No substantial modernization activities are performed: steam pipeline is not reconstructed and technology of salt extracting is not upgraded.

Emission sources in the baseline that are included into the project boundary are:

- Carbon dioxide emissions from combustion of fuel oil in the boilers DKVR 10-13 for steam generation

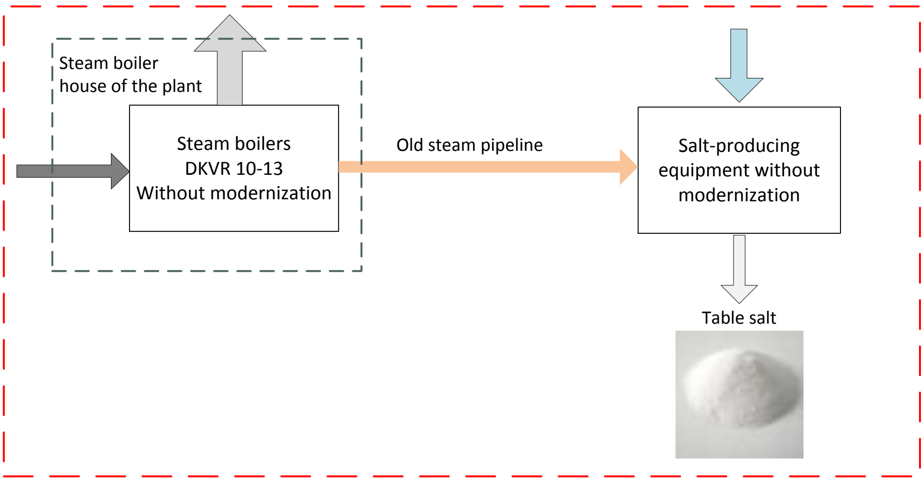

Figure 3: Project boundaries and sources of greenhouse gas emissions in the baseline scenario

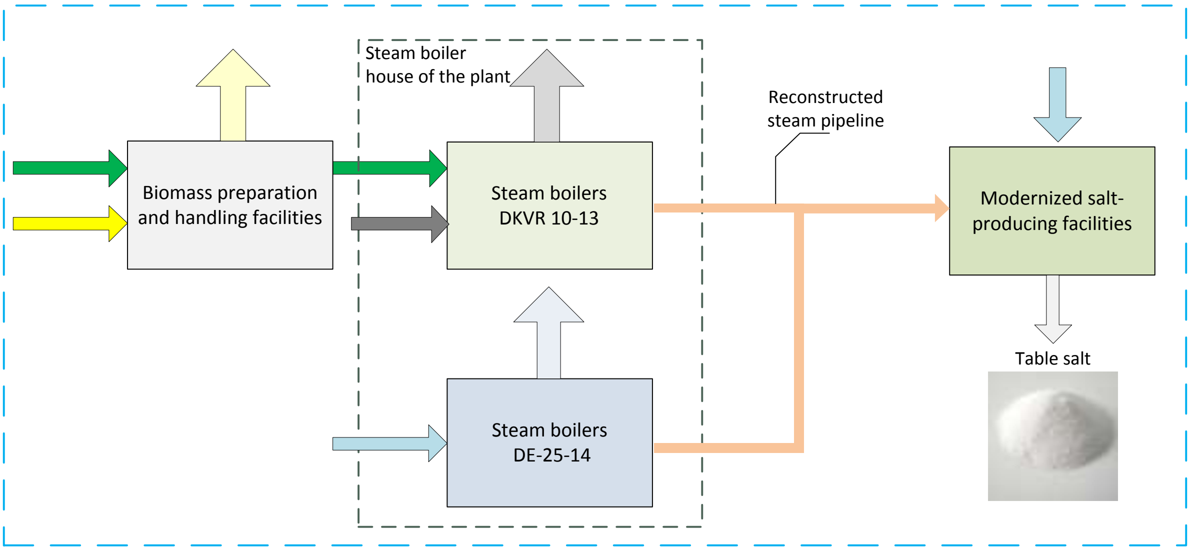

Figure 4: Project boundaries and sources of greenhouse gas emissions in the baseline and project scenario

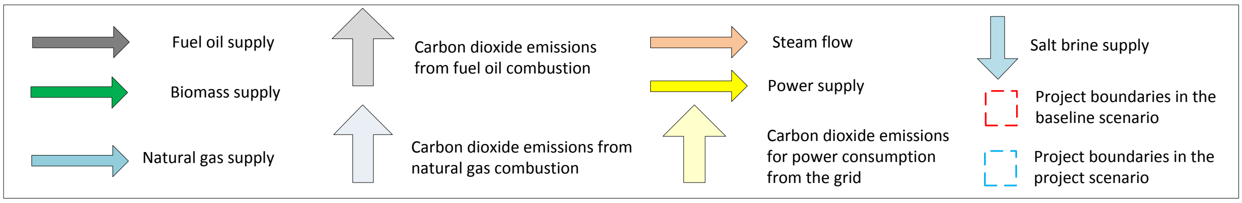

Figure 5: Legend for the scheme of project boundaries and sources of greenhouse gas emissions in the baseline and project scenarios

Project scenario

In the project scenario the plant implemented several measures aimed at energy-efficiency and reduction of GHG emissions. The steam production was switched from fuel oil to fuel oil, natural gas and biomass; later on consumption of fuel oil has been ceased. Additionally, the plant carried out reconstruction of steam pipeline and modernization of salt producing technology.

Emission sources in the project scenario that are included into the project boundary are:

- Carbon dioxide emissions from combustion of fuel oil for steam generation;
- Carbon dioxide emissions from combustion of natural gas for steam generation;
- Carbon dioxide emissions associated with electricity consumption by the equipment for biomass preparation and handling.

Energy consumption for salt brine production and purification, and for salt drying is equal in the baseline and project scenarios, thus it is not accounted in calculation of emission reductions.

Leakage

Leakage is 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.

The leakages which occur during the implementation of the project are carbon dioxide emissions from fuel combustion during the biomass transportation from a supplier to the plant.

The main supplier of biomass is Cargill plant, Donetsk. The distance from Cargill to Slavyansk Salt-Mining Company LLC is approximately 125 km. Conservatively assuming that the 30 tonne trucks, that usually supply pellets to the plant consume 100 litres of diesel per 100 km, the diesel consumption per tonne of biomass will be 100×125×2/30/100 = 8.33 [litres/tonne].

The maximal expected biomass consumption of the plant per year is 13500 tonnes. Thereby, diesel fuel consumption for the biomass transportation constitutes 8.33×13500=112500 [litres] = 95.6 tonnes (DSTU 3868-99 Diesel Fuel. Specifications. 0.85 kg/l is taken as an average between two suggested types of diesel: summer and winter). Carbon dioxide emission factor of 1 tonne of diesel fuel is about 3.15 t CO_2e/t of diesel. Thus, carbon dioxide emissions from combustion of 95.6 tonnes of diesel fuel constitutes 300 tonnes of CO_2 equivalent.

According to the Paragraph 18 of the "Guidance on Criteria for Baseline Setting and Monitoring" version 03, only those emission sources that account for, on average per year over the crediting period, more than 1 per cent of the difference between project and baseline emissions, or which exceed an amount of 2 000 tonnes of CO_2 equivalent, whichever is lower, shall be included.

In the current case, the leakages of the project are 300 tonnes of CO_2 equivalent. Annual average difference between project and baseline emissions is over 40 000 tonnes of CO_2 equivalent, one percent of which is over 400 tonnes of CO_2 equivalent. Thus the leakages are below the consideration level, and they will be excluded from the calculation of emission reductions for simplification. Moreover, fuel oil delivery to the plant in the baseline scenario is also associated with leakages, such as power and diesel consumption for railway delivery. This leakage was also not taken into account, which is conservative.

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: 20/02/2012

Name of person/entity setting the baseline:

Person: Iurii Petruk, JI Consultant

Entity: Global Carbon B.V.

Email: Petruk@global-carbon.com

Phone: +380 44 272 0897

Fax: +380 44 272 0887

Global Carbon B.V. is the project participant and contact details are available in Annex 1.

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Starting date of the project is 8 November, 2007. This is the day when works on rehabilitation of natural gas-fired boiler DE-25-14 started.

C.2. Expected operational lifetime of the project:

The operational lifetime of the whole project is taken as 12 years and 0 months or 144 months (from 01/01/2008 to 31/12/2019). The expected operational lifetime of the project equipment is: 12 years for new boilers DE 25-14 and 10 years for the other equipment. Thus the operational lifetime of the project does not exceed the operational lifetime of the project equipment.

C.3. Length of the crediting period:

Start of the crediting period: 01/01/2008. This is the date of the project operation start (start of consuming natural gas instead of fuel oil for salt manufacturing).

Length of crediting period: 5 years and 0 months or 60 months.

Emission reductions generated after the crediting period may be used in accordance with an appropriate mechanism under the UNFCCC. The crediting period can extend beyond 2012 subject to the approval by the Host Party. Taking this possible extension into account the length of the crediting period starting on the 01/01/2008 will be 12 years and 0 months or 144 months, finishing on 31/12/2019.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

In order to provide a detailed description of the monitoring plan chosen a step-wise approach is used:

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

Option *a* provided by the "Guidelines for users of the Joint Implementation project design document form" version 04[15]. JI specific approach is used for this project and therefore will be used for establishment of a monitoring plan. The monitoring plan will provide for:

1. *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:*
   A clear management structure will be identified to establish the division of responsibilities for gathering monitoring data. Respective services of the plant will collect relevant data in the form of technical reports and other statistical documents. All monitored data will be stored both electronically and in hard copy. The data will be archived and kept at least 2 years after last transfer of emission reduction units.
2. *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 baseline data fixed ex-ante will be determined using statistical data collected for 3 years prior the project implementation. Data from technical reports, control measurements and calculations and other statistical documents will be applied. All monitored data will be stored both electronically and in hard copy. The data will be archived and kept at least 2 years after last transfer of emission reduction units.
3. *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:*
   No significant leakages take place during the project activities. The only source of greenhouse gas emissions outside the project boundaries and attributable to the project are emissions from electric energy generation at power plants operating on combustive fuel. This source is considered in the monitoring of greenhouse gas emissions by use of applying *specific coefficient of GHG emissions due to consumption of electricity from the Ukrainian power grid*, calculated for each year by the Ukrainian DFP, namely, State Environmental Investment Agency (SEIA) of Ukraine.
4. *Quality assurance and control procedures for the monitoring process:*
   The quality of collected data will be secured by conducting regular calibrations of applied meters and sensors. Calibration interval will be chosen as per passport or technical manual data. The regional representative of State Metrological System of Ukraine accompanied by energy department of the plant will be responsible for calibration procedures. All measurement devices will be kept in optimal conditions; if any malfunction occurs, the

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

meter will be displaced with similar one and the monitored data will be cross-checked and calculated by use of statistical information. The troubleshooting will be made by maintenance mechanics or on-duty electrician/operator.

5. *Procedures for the periodic calculation of the reductions of anthropogenic emissions by sources by the proposed JI project, and for leakage effects, if any;*
   Calculation of anthropogenic emissions by sources will take place on a periodic basis. Data for the respecting period will be collected by the plant and transferred to Global Carbon B.V. Obtained data will be processed and greenhouse gas emissions will be calculated according to the latest carbon emission factors and regulations in power.

Step 2. Application of the approach chosen

Key factors that affect the Project and the baseline are taken into account and described in detail in Section B.1.

The project activity will include monitoring of greenhouse gas emissions in the project and baseline scenarios. Detailed information on emission sources of the project and baseline is presented hereunder.

In order to calculate emission reductions following assumptions were made:

1) The salt produced within the project scenario displaces the same amount of the same type of salt that would be produced in the baseline scenario;
2) The proposed project will not influence the salt production level;
3) The only sources of thermal energy used for salt production are the described boilers DKVR 10-13 and DE 25-14. No other sources will be used. All steam generated by the boilers DKVR 10-13 and DE 25-14 is used for salt production purposes;
4) Power consumption for steam production and technological cycle of salt production will be equal in the baseline and project scenario; power consumption for biomass preparation and handling will be calculated separately;
5) Climate-neutral biomass will be used in the project scenario, thus no greenhouse gases will be emitted during its combustion in the boilers.

Formulae applied for calculation of generated emission reductions during the Project:

<u>Emission reductions of the project</u>

Emission reductions due to the implementation of this project will be obtained due to the next major activities:

- Fuel switch from carbon-intensive fuel oil to less carbon-intensive natural gas and climate-neutral solid biomass;
- Improvement of thermal energy generation, distribution and consumption schemes

According to the JI specific approach emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \qquad \text{(Equation ER-1)}$$

Where:

ER_y – Carbon dioxide emission reductions in JI Project in year *y*, [tCO_2e];
BE_y – Baseline emissions in year *y*, [tCO_2e];
PE_y – Project scenario emissions in year *y*, [tCO_2e];
LE_y – Leakages in year *y*, [tCO_2e].

Project leakages

The Project activities do not lead to any significant leakages outside the project boundaries, $LE_y = 0$.

Baseline emissions of the project

The baseline scenario is the continuation of the existing situation. Heat generation, distribution and consumption scheme at the plant is outdated and inefficient. The plant utilizes steam boilers DKVR 10-13 designed for operation on fuel oil. The steam is transferred through the old steam pipeline to the salt extraction facilities. Salt producing facilities are not modernized and consume thermal energy inefficiently.

Emission sources in the baseline that are included in the project boundary are:

- Carbon dioxide emissions from combustion of fuel oil in boilers DKVR 10-13

Baseline emissions will be estimated by the following formula:

$$BE_y = SHC_{Salt,BL} \cdot P_{Salt,PJ,y} \cdot EF_{CO2,Fuel\_oily} \qquad \text{(Equation B-1)}$$

Where:

BE_y – Baseline emissions in year *y*, [tCO_2e];
$P_{Salt,PJ,y}$ – Quantity of salt produced in the project scenario in year *y*, [t];
$SHC_{Salt,BL}$ – Specific consumption of thermal energy for salt production in the baseline scenario, [GJ/t];
$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ].

Carbon dioxide emission factor for fuel oil combustion is calculated as follows:

$$EF_{CO2,Fuel\_oil,y} = \frac{OXID_{Fuel\_oil,y} \cdot k^{C}_{Fuel\_oil,y} \cdot 44/12}{1000} \qquad \text{(Equation B-2)}$$

Where:

$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ];
$OXID_{Fuel\_oil,y}$ – Carbon oxidation factor of fuel oil in year *y*, [ratio];
$k^{C}_{Fuel\_oil,y}$ – Carbon content of fuel oil in year *y*, [tC/TJ];
44/12 – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2;
1/1000 – Conversion factor from GJ into TJ.

Project scenario emissions

In the project scenario, the plant operates two natural gas fired boiler DE-25-14 and three boilers DKVR 10-13 adopted for operation on solid biomass. Specially developed biomass handling structure operates consuming power from the grid.

Emission sources in the project scenario:

- Carbon dioxide emissions from combustion of fuel oil in boilers DKVR 10-13;
- Carbon dioxide emissions from combustion of natural gas in boilers DE-25-14;
- Carbon dioxide emissions associated with the electricity consumption by the equipment for biomass preparation and handling.

$$PE_y = PE_{Fuel,y} + PE_{ELEC,y} \qquad \text{(Equation P-1)}$$

Where:

PE_y – Project scenario emissions in year *y*, [tCO_2e];
$PE_{Fuel,y}$ – Project emissions due to fossil fuel consumption in year *y*, [tCO_2e];
$PE_{ELEC,y}$ – Project emissions due to electricity consumption for biomass handling in year *y*, [tCO_2e].

$$PE_{Fuel,y} = FC_{Fuel\_oil,PJ,y} \cdot NCV_{Fuel\_oil,y} \cdot EF_{CO2,Fuel\_oily} + FC_{NG,PJ,y} \cdot NCV_{NG,y} \cdot EF_{CO2,NG,y}$$ (Equation P-2)

Where:

$PE_{Fuel,y}$ – Project emissions due to fossil fuel consumption in year *y*, [tCO_2e];
$FC_{Fuel\_oil,PJ,y}$ – Consumption of fuel oil for production of salt in the project scenario in year *y*, [t];
$NCV_{Fuel\_oil,y}$ – Net calorific value of fuel oil in year *y*, [GJ/t];
$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ];
$FC_{NG,PJ,y}$ – Consumption of natural gas for production of salt in year *y*, [1000 m^3];
$NCV_{NG,y}$ – Net calorific value of natural gas in year y, [GJ/1000 m^3];
$EF_{CO2,NG,y}$ – Carbon dioxide emission factor for natural gas combustion in year *y*, [tCO_2e/GJ].

Carbon dioxide emission factor for fuel oil combustion is calculated as follows:

$$EF_{CO2,Fuel\_oil,y} = \frac{OXID_{Fuel\_oil,y} \cdot k^{C}_{Fuel\_oil,y} \cdot 44/12}{1000}$$ (Equation P-3)

Where:

$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ];
$OXID_{Fuel\_oil,y}$ – Carbon oxidation factor of fuel oil in year *y*, [ratio];
$k^{C}_{Fuel\_oil,y}$ – Carbon content of fuel oil in year *y*, [tC/TJ];
44/12 – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2;
1/1000 – Conversion factor from GJ into TJ.

Carbon dioxide emission factor for natural gas combustion is calculated as follows:

$$EF_{CO2,NG,y} = \frac{OXID_{NG,y} \cdot k^{C}_{NG,y} \cdot 44/12}{1000}$$

(Equation P-4)

Where:

$EF_{CO2,NG,y}$ – Carbon dioxide emission factor for natural gas combustion in year *y*, [tCO_2e/GJ];
$OXID_{NG,y}$ – Carbon oxidation factor of natural gas in year *y*, [ratio];
$k^{C}_{NG,y}$ – Carbon content of natural gas in year *y*, [tC/TJ];
44/12 – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2;
1/1000 – Conversion factor from GJ into TJ.

$$PE_{ELEC,y} = EC_{Biomass,PJ,y} \cdot EF_{CO2,ELEC,y} \quad \text{(Equation P-5)}$$

Where:
$PE_{ELEC,y}$ – Project emissions due to electricity consumption for biomass handling in year *y*, [tCO_2e];
$EC_{Biomass,PJ,y}$ – Electricity consumption for biomass handling in the project scenario in year *y*, [MWh];
$EF_{CO2,ELEC,y}$ – Specific emission factor of carbon dioxide for electricity consumed from the grid in year *y*, [tCO_2e/MWh].

Determination of data and parameters applied for the monitoring

a) Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination regarding the PDD:

Table 12 Data and parameters that are not monitored throughout the crediting period, but are determined only once and that are available already at the stage of determination regarding the PDD

Parameter	**Value**	**Unit**	**Description**	**Source of data/Comments**
$SHC_{Salt,BL}$	7.296	GJ/t	Specific consumption of thermal energy for salt production in the baseline scenario	This data is calculated based on actual records obtained for three years before the project implementation. This value is the specific heat consumption for salt production for the period 2005-2007

b) Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), but that are not already available at the stage of determination regarding the PDD:

There are no such data and parameters in the Project;

c) Data and parameters that are monitored throughout the crediting period:

Table 13 Data and parameters that are monitored throughout the crediting period

Parameter	Value	Unit	Description	Source of data/Comments
$P_{Salt,PJ,y}$	To be monitored throughout the crediting period	t	Quantity of salt produced in the project scenario in year *y*	The value will be measured and recorded in technical reports of the plant
$FC_{Fuel\_oil,PJ,y}$	To be monitored throughout the crediting period	t	Consumption of fuel oil for production of salt in the project scenario in year *y*	The value will be measured and recorded in technical reports of the plant
$FC_{NG,PJ,y}$	To be monitored throughout the crediting period	1000 m^3	Consumption of natural gas for production of salt in year *y*	The value will be measured and recorded in technical reports of the plant
$EF_{CO2,ELEC,y}$	To be monitored throughout the crediting period	tCO_2e/ MWh	Specific emission factor of carbon dioxide for electricity consumed from the grid in year *y*	Calculation performed by Ukrainian DFP
$EC_{Biomass,PJ,y}$	To be monitored throughout the crediting period	MWh	Electricity consumption for biomass handling in the project scenario in year *y*	The value is estimated based on the electrical capacity and runtime of the applied equipment and other relevant parameters
$OXID_{Fuel\_oil,y}$	To be monitored throughout the crediting period	ratio	Carbon oxidation factor of fuel oil in year *y*	National Inventory Report of Ukraine
$OXID_{NG,y}$	To be monitored throughout the crediting period	ratio	Carbon oxidation factor of natural gas in year *y*	National Inventory Report of Ukraine
$k^{C}_{Fuel\_oil,y}$	To be monitored throughout the crediting period	tC/TJ	Carbon content of fuel oil in year *y*	National Inventory Report of Ukraine
$k^{C}_{NG,y}$	To be monitored throughout the crediting period	tC/TJ	Carbon content of natural gas in year *y*	National Inventory Report of Ukraine

$NCV_{Fuel\_oil,y}$	To be monitored throughout the crediting period	GJ/t	Net calorific value of fuel oil in year *y*	National Inventory Report of Ukraine
$NCV_{NG,y}$	To be monitored throughout the crediting period	GJ/1000 m^3	Net calorific value of natural gas in year *y*	National Inventory Report of Ukraine

The monitoring process envisages fulfilling next actions that are directed at minimizing the uncertainty level and safeguarding the conservativeness:

1) Default values were used to the extent possible in order to reduce uncertainty and provide conservative data for emission calculations;
2) The devices that are used for measurement of the project parameters are properly calibrated and provide data with high level of confidence;
3) In order to establish specific factors in the baseline, historical data for the relevant period have been used;
4) In case of absence of relevant data, baseline and project values have been calculated using conservative assumptions.

Setup of measurement installation

The monitoring of the project activity is based on measuring such parameters as salt production; fuel oil and natural gas consumption; electricity consumption for biomass preparation. The values are logged in technical reports and accounting documents of the plant.

The measurement setup will be based on the following meters: For natural gas consumed - the “Kurs-01” ultrasonic gas flow meter; for fuel oil consumed – float level gauge and measuring staff. For crosschecking of the fuel consumption, information from accounting department will be used: receipts for the fuel purchased; reports and accounting documents for fuel usage. Value for quantity of salt produced will be taken from inventory reports of the plant, based on values obtained from electronic scales at the packing line. As soon as biomass preparation facilities are stretched over the plant territory, there is no meter that would monitor their electricity consumption. Thereby, it will be estimated based on electrical capacity and runtime of the applied equipment, and other relevant parameters.

Archiving, data storage and record procedure

Documents and reports on the data that are monitored will be archived and stored by the project participants. The following documents will be stored: primary documents for the accounting of monitored parameters in paper form; intermediate reports, orders and other monitoring documents in paper and electronic form; documents on measurement devices in paper and electronic form. These documents and other data monitored and required for determination and verification, as well as any other data that are relevant to the operation of the project will be kept for at least two years after the last transfer of ERUs.

Training of monitoring personnel

The project will utilize technology that requires skills and knowledge in such activities as biomass boilers maintenance, salt producing facilities operation, electric equipment operation etc. This kind of skills and knowledge is available locally through the system of trainings and education programs. Only workers with proper training can be allowed to operate specialized equipment. The labor protection department of the plant is responsible for trainings and examination of the staff. Management of the project host will ensure that personnel of the project have received proper training and are eligible to work with the prescribed equipment.

Training on safety issues is mandatory and must be provided to all personnel of the project as required by local regulations. Procedure for safety trainings includes the scope of the trainings, training intervals, forms of training, knowledge checks etc. The project host management will maintain records for such trainings and periodic knowledge check-ups.

Activities that are directly related to the monitoring do not require specific training other than provided by the professional education. However, monitoring personnel will receive training on monitoring procedures and requirements. Personnel of the project host management will receive necessary training and consultations on Kyoto Protocol, JI projects and monitoring from the project participant – Global Carbon B.V.

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

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

The project host management will also establish a communication channel that will make it possible to submit suggestions, improvement proposals and project ideas for more accurate future monitoring for every person involved in the monitoring activities. Such communications will be delivered to the project host management who is required to review these communications and in case it is found appropriate implement necessary corrective actions and improvements. Project participant – Global Carbon B.V. – will conduct periodic review of the monitoring plan and procedures and if necessary propose improvements to the project participants.

Emergency preparedness for cases where emergencies can cause unintended emissions

The project operation does not foresee any factors or emergencies that can cause unintended GHG emissions. Safe operation of equipment and personnel is ensured by systematic safety training. Procedures for dealing with general emergencies such as fire, major malfunction etc. are developed as part of the mandatory business regulations and are in accordance with local requirements.

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

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
P1	$FC_{Fuel\_oil,PJ,y}$ - Consumption of fuel oil for production of salt in the project scenario in year *y*	Company records	t	m	Annually	100%	Electronic and paper	
P2	$FC_{NG,PJ,y}$ - Consumption of natural gas for production of salt in year *y*	Company records	1000 m^3	m	Annually	100%	Electronic and paper	
P3	$EF_{CO2,ELEC,y}$ – Specific emission factor of carbon dioxide for electricity consumed from the grid in year *y*	Calculations performed by Ukrainian DFP	tCO_2e/ MWh	c	Annually. Upon issue of the Ukrainian DFP order	100%	Electronic and paper	See Annex 4 for detail
P4	$EC_{Biomass,PJ,y}$ – Electricity consumption for biomass handling in the project scenario in year *y*	Calculations based on the electrical capacity and runtime of the applied equipment, and other relevant parameters	MWh	c	Annually	100%	Electronic and paper	
P5	$NCV_{Fuel\_oil,y}$ – Net	National Inventory	GJ/t	e	Annually	100%	Electronic and	

	calorific value of fuel oil in year *y*	Reports of Ukraine					paper	
P6	$NCV_{NG,y}$ – Net calorific value of natural gas in year *y*	National Inventory Reports of Ukraine	GJ/1000 m^3	e	Annually	100%	Electronic and paper	
P7	$OXID_{Fuel\_oil,y}$ – Carbon oxidation factor of fuel oil in year *y*	National Inventory Reports of Ukraine	ratio	e	Annually	100%	Electronic and paper	
P8	$OXID_{NG,y}$ – Carbon oxidation factor of natural gas in year *y*	National Inventory Reports of Ukraine	ratio	e	Annually	100%	Electronic and paper	
P9	$k^{C}_{Fuel\_oil,y}$ – Carbon content of fuel oil in year *y*	National Inventory Reports of Ukraine	tC/TJ	e	Annually	100%	Electronic and paper	
P10	$k^{C}_{NG,y}$ – Carbon content of natural gas in year *y*	National Inventory Reports of Ukraine	tC/TJ	e	Annually	100%	Electronic and paper	

The table above includes data and parameters that are monitored throughout the crediting period.

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

Emissions from the project activity are calculated as follows:

$$PE_y = PE_{Fuel,y} + PE_{ELEC,y}$$ (Equation P-1)

Where:

PE_y – Project scenario emissions in year *y*, [tCO_2e];

$PE_{Fuel,y}$ – Project emissions due to fossil fuel consumption in year *y*, [tCO_2e];

$PE_{ELEC,y}$ – Project emissions due to electricity consumption for biomass handling in year *y*, [tCO_2e].

$$PE_{Fuel,y} = FC_{Fuel\_oil,PJ,y} \cdot NCV_{Fuel\_oil,y} \cdot EF_{CO2,Fuel\_oily} + FC_{NG,PJ,y} \cdot NCV_{NG,y} \cdot EF_{CO2,NG,y}$$ (Equation P-2)

Where:

$PE_{Fuel,y}$ – Project emissions due to fossil fuel consumption in year *y*, [tCO_2e];
$FC_{Fuel\_oil,PJ,y}$ – Consumption of fuel oil for production of salt in the project scenario in year *y*, [t];
$NCV_{Fuel\_oil,y}$ – Net calorific value of fuel oil in year *y*, [GJ/t];
$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ];
$FC_{NG,PJ,y}$ – Consumption of natural gas for production of salt in year *y*, [1000 m^3];
$NCV_{NG,y}$ – Net calorific value of natural gas in year *y*, [GJ/1000 m^3];
$EF_{CO2,NG,y}$ – Carbon dioxide emission factor for natural gas combustion in year *y*, [tCO_2e/GJ].

Carbon dioxide emission factor for fuel oil combustion is calculated as follows:

$$EF_{CO2,Fuel\_oil,y} = \frac{OXID_{Fuel\_oil,y} \cdot k^{C}_{Fuel\_oil,y} \cdot 44/12}{1000}$$ (Equation P-3)

Where:

$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ];
$OXID_{Fuel\_oil,y}$ – Carbon oxidation factor of fuel oil in year *y*, [ratio];
$k^{C}_{Fuel\_oil,y}$ – Carbon content of fuel oil in year *y*, [tC/TJ];
44/12 – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2;
1/1000 – Conversion factor from GJ into TJ.

Carbon dioxide emission factor for natural gas combustion is calculated as follows:

$$EF_{CO2,NG,y} = \frac{OXID_{NG,y} \cdot k^{C}_{NG,y} \cdot 44/12}{1000}$$

(Equation P-4)

Where:

$EF_{CO2,NG,y}$ – Carbon dioxide emission factor for natural gas combustion in year *y*, [tCO_2e/GJ];
$OXID_{NG,y}$ – Carbon oxidation factor of natural gas in year *y*, [ratio];
$k^{C}_{NG,y}$ – Carbon content of natural gas in year *y*, [tC/TJ];
44/12 – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2;
1/1000 – Conversion factor from GJ into TJ.

$$PE_{ELEC,y} = EC_{Biomass,PJ,y} \cdot EF_{CO2,ELEC,y}$$ (Equation P-5)

Where:
$PE_{ELEC,y}$ – Project emissions due to electricity consumption for biomass handling in year *y*, [tCO_2e].
$EC_{Biomass,PJ,y}$ – Electricity consumption for biomass handling in the project scenario in year *y*, [MWh];
$EF_{CO2,ELEC,y}$ – Specific emission factor of carbon dioxide for electricity consumed from the grid in year *y*, [tCO_2e/MWh].

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
B1	$P_{Salt,PJ,y}$ - Quantity of salt produced in the project scenario in year *y*	Company records	t	m	Annually	100%	Electronic and paper	
B2	$OXID_{Fuel\_oil,y}$ – Carbon oxidation factor of fuel oil in year *y*	National Inventory Reports of Ukraine	ratio	e	Annually	100%	Electronic and paper	

B3	$k^{C}_{Fuel\_oil,y}$ – Carbon content of fuel oil in year *y*	National Inventory Reports of Ukraine	tC/TJ	e	Annually	100%	Electronic and paper	

The table above includes data and parameters that are monitored throughout the crediting period.

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

Emissions in the baseline scenario are calculated as follows:

$$BE_y = SHC_{Salt,BL} \cdot P_{Salt,PJ,y} \cdot EF_{CO2,Fuel\_oily} \quad \text{(Equation B-1)}$$

Where:

BE_y – Baseline emissions in year *y*, [tCO_2e];
$P_{Salt,PJ,y}$ – Quantity of salt produced in the project scenario in year *y*, [t];
$SHC_{Salt,BL}$ – Specific consumption of thermal energy for salt production in the baseline scenario, [GJ/t];
$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ].

Carbon dioxide emission factor for fuel oil combustion is calculated as follows:

$$EF_{CO2,Fuel\_oil,y} = \frac{OXID_{Fuel\_oil,y} \cdot k^{C}_{Fuel\_oil,y} \cdot 44/12}{1000} \quad \text{(Equation B-2)}$$

Where:

$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ];
$OXID_{Fuel\_oil,y}$ – Carbon oxidation factor of fuel oil in year *y*, [ratio];
$k^{C}_{Fuel\_oil,y}$ – Carbon content of fuel oil in year *y*, [tC/TJ];
44/12 – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2;
1/1000 – Conversion factor from GJ into TJ.

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

This section is left blank on purpose

D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

This section is left blank on purpose

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

This section is left blank on purpose

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

Please see Section B.3. for description of leakages in detail.

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

This section is left blank on purpose

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

No significant leakages will occur during the project lifetime, $LE_y = 0$. Please see Section B.3. for description of leakages in detail.

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):

According to the JI specific approach annual emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{(Equation ER-1)}$$

Where:

ER_y – Carbon dioxide emission reductions in JI Project in year *y*, [tCO_2e];
BE_y – Baseline emissions in year *y*, [tCO_2e];
PE_y – Project scenario emissions in year *y*, [tCO_2e];
LE_y – Leakages in year *y*, [tCO_2e].

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

The information on the environmental impacts of the project will be gathered by the ecologist of the plant and will be provided to the AIE if necessary.

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:

Data *(Indicate table and ID number)*	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.

D.1.1.1. – ID P1	Low	The fuel oil consumption is measured by float level gauge and measuring staff. The measured values are logged in the daily reports. The operability of the measurement equipment is regularly checked. The responsible personnel is duly trained to perform monitoring of this parameter. The procedures to be followed if expected monitoring data are unavailable are described below this table.
D.1.1.1. – ID P2	Low	The natural gas consumption is measured by the "Kurs-01" ultrasonic gas flow meter. The measured values are logged in the daily reports. The procedures to be followed if expected monitoring data are unavailable are described below this table.
D.1.1.1. – ID P3	Low	Emission factors have been calculated for Ukraine using the country-specific data. From 2011 the value is to be issued by the DFP of Ukraine on an annual basis. If no new factor is issued by DFP, the value for the previous year will applied for calculations
D.1.1.1. – ID P4	Medium	The value is estimated based on the electrical capacity and runtime of the applied equipment, and other relevant parameters. If some of the relevant data is absent, conservative assumptions will be accepted to provide for the calculations.
D.1.1.1. – ID P5, P6	Low	Net calorific values will be taken as per the National Inventory Reports of Ukraine. The National Inventory Reports are expected to be issued by the State Environmental Investment Agency of Ukraine (DFP of Ukraine) on an annual basis. If no new NIR is issued, the data will be taken from the most recent one.
D.1.1.1. – ID P7, P8, P9, P10 D.1.1.3. – ID B2, B7	Low	Carbon content and oxidation values for natural gas and fuel oil will be taken from the National Inventory Reports of Ukraine. The National Inventory Reports are expected to be issued by the State Environmental Investment Agency of Ukraine (DFP of Ukraine) on an annual basis. If no new NIR is issued, the data will be taken from the most recent one.
D.1.1.3. – ID B1	Low	These data are used in commercial activities of the plant. The metering is performed by electronic scales installed at the dosing-packing line of the table salt. In case of any data failure, the relevant data will be derived through cross-checks using technical and commercial reports, and logs from the equipment load.

The measurement equipment undergoes regular calibration of verification procedures to ensure accurate indication; the operability of the measurement equipment is regularly checked. In case of any mistake or failure detected, immediate corrective actions will be performed; the monitored value will be cross-checked with other indications or extrapolated from the previous metering to decrease uncertainty and ensure accuracy. The responsible personnel are duly trained to perform monitoring and logging procedures.

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

The aim of the monitoring plan is to provide the project activity with clear, credible, and accurate set of monitoring, evaluation and verification procedures. The purpose of these procedures would be to direct and support continuous monitoring of project performance/key project indicators to determine project outcomes and greenhouse gas emission reductions.

The clear structure of responsibilities has been implemented to ensure fulfilling of the monitoring plan. Chief engineer holds overall responsibility for monitoring, collection and storage of the data related to the Project. He controls all departments that are obliged to monitor, collect, process and transfer the relevant data. The department heads control subordinates who in their turn collect the data from meters, fill in the technical logs, maintain calibration procedures, provide technical information, transfer the data etc. Eventually, the chief engineer of the plant coordinates operation of all departments and transfer of the necessary data to Global Carbon, which is responsible for performing calculations of generated emission reductions and producing periodic monitoring reports.

The departments mainly involved in collecting and transferring the data for monitoring purposes are:

Technical department

The department will be responsible for supplying all the gathered data to the consultant of the Project which is Global Carbon B.V. It will collect, process, calculate and store all the monitoring data. The department will provide data and information on the implemented technologies and measures and monitoring the project activity.

Energy department

The energy department is responsible for control of fuel and electricity consumption at the plant. It collects data from the natural gas and fuel oil measurement equipment, and performs calculations on amount of electricity consumed for biomass handling. For the purposes of monitoring, the energy department will report fuel and electricity to the technical department of the plant. The department will be responsible for data on all meters engaged in monitoring process. The department will support calibration of the project meters by the regional representative of State Metrological System of Ukraine.

Environmental and labor protection department

Environmental and labor protection department is responsible for management of environmental aspects of plant's operation and relationships with local and central state regulation bodies. Environmental and labor protection department obtains allowances for the plant's operation and monitors level of environmental impact caused by the plant. Also the department is responsible for training of the personnel and performing regular qualification examinations.

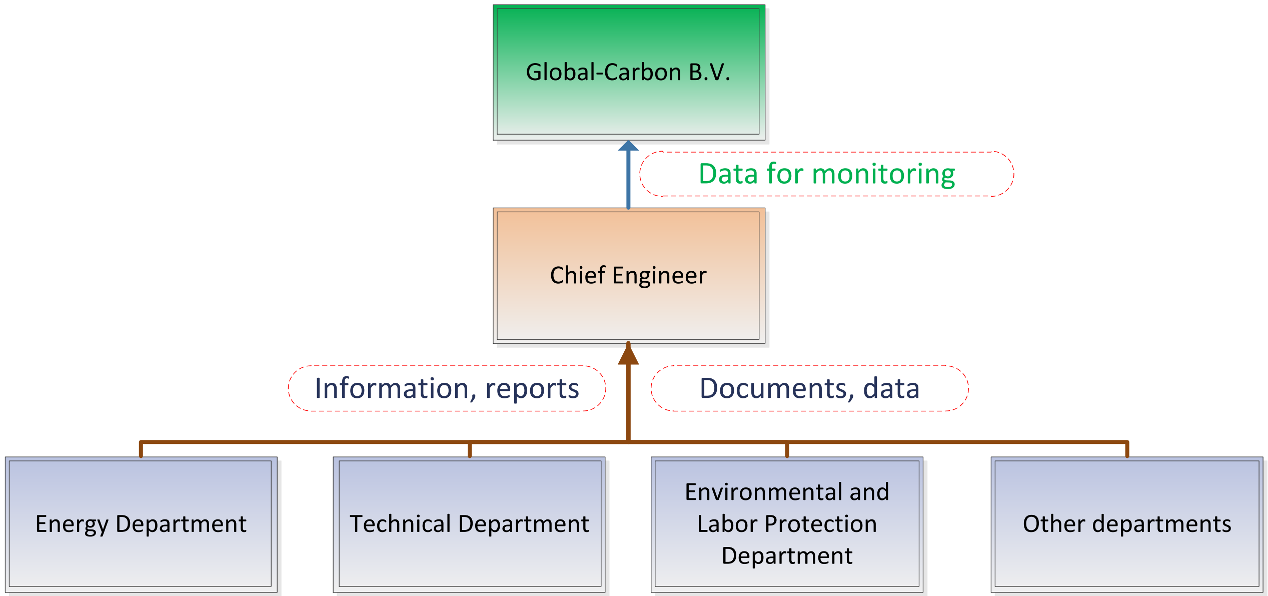

Figure 6: Operational structure for collection of data used for monitoring of emission reductions

On demand, other departments of the plant will also participate in collecting and providing the data relevant for the monitoring purposes.

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

Person: Iurii Petruk, JI Consultant

Entity: Global Carbon B.V.

Email: Petruk@global-carbon.com

Phone: +380 44 272 0897

Fax: +380 44 272 0887

Global Carbon B.V. is the project participant and contact details are available in Annex 1.

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Table 14 Estimated project emissions during the crediting period

Parameter	Unit	2008	2009	2010	2011	2012	Total
Project emissions due to fossil fuel consumption	tCO_2e	66 959	53 336	30 254	18 273	17 359	**186 181**
Project emissions due to electricity consumption for biomass handling	tCO_2e	0	0	613	1 227	1 227	**3 067**
Total project emissions over the crediting period	tCO_2e	**66 959**	**53 336**	**30 867**	**19 500**	**18 586**	**189 248**

Table 15 Estimated project emissions after the crediting period

Parameter	Unit	2013-2019	Total
Project emissions due to fossil fuel consumption	tCO_2e	17359	**121 513**
Project emissions due to electricity consumption for biomass handling	tCO_2e	1227	**8 589**
Total Project emissions after the crediting period	tCO_2e	**18 586**	**130 102**

E.2. Estimated leakage:

No significant leakages will occur during the project activities.

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

Please see Tables 14 and 15.

E.4. Estimated baseline emissions:

Table 16 Estimated baseline emissions during the crediting period

Parameter	Unit	2008	2009	2010	2011	2012	Total
Baseline emissions over the crediting period	tCO_2e	76 042	82 479	86 435	78 400	78 400	**401 756**

Table 17 Estimated baseline emissions after the crediting period

Parameter	Unit	2013-2019	Total
Baseline emissions after the crediting period	tCO_2e	78 400	**548 800**

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

Table 18 Estimated emission reductions during the crediting period

Parameter	Unit	2008	2009	2010	2011	2012	Total
Emission reductions over the crediting period	tCO_2e	9 083	29 143	55 568	58 900	59 814	**212 508**

Table 19 Estimated emission reductions after the crediting period

Parameter	Unit	2013-2019	Total
Emission reductions after the crediting period	tCO_2e	59 814	**418 698**

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

Table 20 Estimated balance of emissions under the proposed project over the crediting period

Year	Estimated Project Emissions (tonnes CO_2 Equivalent)	Estimated Leakage (tonnes CO_2 Equivalent)	Estimated Baseline Emissions (tonnes CO_2 Equivalent)	Estimated Emissions Reductions (tonnes CO_2 Equivalent)
2008	66 959	0	76 042	9 083
2009	53 336	0	82 479	29 143
2010	30 867	0	86 435	55 568
2011	19 500	0	78 400	58 900
2012	18 586	0	78 400	59 814
Total (tonnes CO_2 Equivalent)	**189 248**	**0**	**401 756**	**212 508**

Table 21 Estimated balance of emissions under the proposed project after the crediting period

Year	Estimated Project Emissions (tonnes CO_2 Equivalent)	Estimated Leakage (tonnes CO_2 Equivalent)	Estimated Baseline Emissions (tonnes CO_2 Equivalent)	Estimated Emissions Reductions (tonnes CO_2 Equivalent)
2013	18 586	0	78 400	59 814
2014	18 586	0	78 400	59 814
2015	18 586	0	78 400	59 814
2016	18 586	0	78 400	59 814
2017	18 586	0	78 400	59 814
2018	18 586	0	78 400	59 814
2019	18 586	0	78 400	59 814
Total (tonnes CO_2 Equivalent)	**130 102**	**0**	**548 800**	**418 698**

SECTION F. Environmental impacts

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

The Host Party for this project is Ukraine. Environmental Impact Assessment (EIA) is the part of the Ukrainian project planning and permitting procedures. Implementation regulations for EIA are included in the Ukrainian State Construction Standard DBN A.2.2.-1-2003[16] (Title: "Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures").

Annex E of this standard contains a list of "types of projects or activities which constitute higher environmental risk" for which full EIA is mandatory, and the Ministry of Environment being the competent authority. Project activity, which is modernization of steam boilers for operation on solid biomass, is included in this list.

The full scope EIA in accordance with the Ukrainian legislation has been conducted for the proposed project in 2011 by "Ekotehnologiya" LLC, Donetsk. Key findings of this EIA are summarized below:

1) The level of emissions into the atmosphere by the project will be lesser than the maximal allowable level;
2) The impact on the water resources will be minimal. The project does not envisage increase of the water consumption. The project does not have direct discharge into the water objects.
3) The noise effect of the project equipment will not exceed the allowable level;
4) All wastes generated by the project will be transferred to the specialized enterprises for utilization.

Based on the above mentioned, the environmental impact of the project is considered to be allowable.

Transboundary effects

The level of hazardous substance emissions into the surface air caused by the project has been thoroughly analyzed in course of EIA development. After taking probes and performing calculations of concentration of hazardous substances in the surface air within sanitary-protection zone of the plant (100 m) and zone of closest apartment block (500 m), it has been assessed that the level of hazardous substances does not exceed the maximal allowable level.

Taking into account the above mentioned, distance to the closest border (the Russian border is about 150 km from the town of Slavyansk) and the fact that the project impact on water resources and soils is minimal, it is assumed that the project will not have any transboundary impacts.

[16] *State Construction Standard DBN A.2.2.-1-2003 :"Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures"* State Committee Of Ukraine On Construction And Architecture, 2004

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:

The full scope EIA in accordance with the Ukrainian legislation has been conducted for the proposed project in 2011 by "Ekotehnologiya" LLC, Donetsk. The EIA considers various aspects of environmental protection with regard to the project implementation. The quantitative and qualitative characteristics of emission sources have been determined; the environmental impact of the project has been assessed.

The project impact on land, soil, water resources, flora and fauna is minimal. The social impact of the project is positive as if the project creates job opportunities for local residents. Since the project has been implemented within the plant territory and does not require additional allotment of land, it will not cause negative impact on anthropogenic environment.

The main emission source of the project activity is products of the fuel combustion. However the calculation of hazardous substances concentration in the surface air showed that the concentration does not exceed the maximal allowable level. Thus the project does not bring significant negative impact on the environment and does not contradict to Ukrainian laws and regulations.

Taking into account the fact that the project results in significant reduction of fossil fuel consumption and necessarily reduction of greenhouse gas emissions, it is considered to be environmentally sound.

SECTION G. Stakeholders' comments

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

Project participants have informed local stakeholders through the local newspaper about the project implementation as a part of environmental impact assessment (EIA). No negative comments have been received from the local stakeholders.

As a part of determination process, the PDD will be made publicly available for the global stakeholder meeting commenting period and any comments received will be taken into account.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organisation:	Slavyansk Salt-Mining Company LLC
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E-mail:	office@slavsalt.com
URL:	http://slavsalt.com
Represented by:	
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Salutation:	Mr.
Last name:	Skiba
Middle name:	Oleksandrovych
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Personal e-mail:	office@slavsalt.com
EDRPOU code:	30098637
KVED types of economic activities:	14.40.0 Mining and production of salt 40.11.0 Electricity generation 40.12.0 Electricity transmission 40.30.0 Supply of steam and hot water 51.90.0 Other types of wholesale

Organisation:	Global Carbon B.V. (registration date 30/08/2004)
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Represented by:	
Title:	Managing Director
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Annex 2

BASELINE INFORMATION

Table 22 List of data used to establish the baseline emissions

Data/Parameter	$SHC_{Fuel\_oil,BL}$
Data unit	GJ/t
Description	Specific consumption of thermal energy for salt production in the baseline scenario
Time of determination/monitoring	Fixed ex-ante
Source of data (to be) used	Statistical data from the plant
Value of data applied (for ex ante calculations/determinations)	7.296
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This data is calculated based on actual records obtained for three years before the project implementation. This value is the specific heat consumption for salt production for the period 2005-2007.
QA/QC procedures (to be) applied	According to the policy of the plant
Any comment	Please see Annex 2 for details

Data/Parameter	$P_{Salt,PJ,y}$
Data unit	t
Description	Quantity of salt produced in the project scenario in year *y*
Time of determination/monitoring	On an annual basis
Source of data (to be) used	Technical reports of the plant
Value of data applied (for ex ante calculations/determinations)	Set ex-post during monitoring
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Data from the electronic scales at the packing line
QA/QC procedures (to be) applied	According to the policy of the plant
Any comment	

Data/Parameter	$OXID_{Fuel\_oil,y}$
Data unit	ratio
Description	Carbon oxidation factor of fuel oil in year *y*
Time of determination/monitoring	On an annual basis
Source of data (to be) used	National Inventory Report of Ukraine
Value of data applied (for ex ante calculations/determinations)	Set ex-post during monitoring
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Country-specific data is presented in National Inventory Reports of Ukraine

QA/QC procedures (to be) applied	Data from the most recent National Inventory Report of Ukraine will be applied
Any comment	

Data/Parameter	$k^C_{Fuel\_oil,y}$
Data unit	tC/TJ
Description	Carbon content of fuel oil in year *y*
Time of determination/monitoring	On an annual basis
Source of data (to be) used	National Inventory Report of Ukraine
Value of data applied (for ex ante calculations/determinations)	Set ex-post during monitoring
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Country-specific data is presented in National Inventory Reports of Ukraine
QA/QC procedures (to be) applied	Data from the most recent National Inventory Report of Ukraine will be applied
Any comment	

Emissions in the baseline scenario are calculated as follows:

$$BE_y = SHC_{Salt,BL} \cdot P_{Salt,PJ,y} \cdot EF_{CO2,Fuel\_oily}$$ (Equation B-1)

Where:

BE_y – Baseline emissions in year *y*, [tCO_2e];
$P_{Salt,PJ,y}$ – Quantity of salt produced in the project scenario in year *y*, [t];
$SHC_{Salt,BL}$ – Specific consumption of thermal energy for salt production in the baseline scenario, [GJ/t];
$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ].

Carbon dioxide emission factor for fuel oil combustion is calculated as follows:

$$EF_{CO2,Fuel\_oil,y} = \frac{OXID_{Fuel\_oil,y} \cdot k^C_{Fuel\_oil,y} \cdot 44/12}{1000}$$ (Equation B-2)

Where:

$EF_{CO2,Fuel\_oil,y}$ – Carbon dioxide emission factor for fuel oil combustion in year *y*, [tCO_2e/GJ];
$OXID_{Fuel\_oil,y}$ – Carbon oxidation factor of fuel oil in year *y*, [ratio];
$k^C_{Fuel\_oil,y}$ – Carbon content of fuel oil in year *y*, [tC/TJ];
44/12 – Ratio between molecular mass of CO_2 and C. Reflect oxidation of C to CO_2;
1/1000 – Conversion factor from GJ into TJ.

Specific consumption of thermal energy for salt production in the baseline scenario is calculated as follows:

$$SHC_{Salt,BL} = FC_{Fuel\_oil,BL} \cdot NCV_{Fuel\_oil} / P_{Salt,BL}$$ (Equation B-3)

Where:

$SHC_{Salt,BL}$ – Specific consumption of thermal energy for salt production in the baseline scenario, [GJ/t];

$FC_{Fuel\_oil,BL}$ – Annual average consumption of fuel oil for production of salt before the project implementation, [t];

NCV_{Fuel_oil} – Net calorific value of fuel oil, [GJ/t];

$P_{Salt,BL}$ – Annual average amount of salt produced before the project implementation, [t].

Table 23 Salt production and fuel consumption before the project implementation

	Unit	2005	2006	2007	Average
Salt production	t	135460	135700	136080	135746.7
Fuel oil consumption	t	24576.1	25003.7	24883.2	24821

$FC_{Fuel\_oil,BL}$ = 24821 t (See Table 23, average fuel oil consumption)
NCV_{Fuel_oil} = 39.9 GJ/t (National Inventory Report of Ukraine, 1990-2009[17], Table P2.30, NCV for fuel oil, food industries)
$P_{Salt,BL}$ = 135746.7 t (See Table 23, average salt production)

$$SHC_{Salt,BL} = FC_{Fuel\_oil,BL} \cdot NCV_{Fuel\_oil} / P_{Salt,BL} = 24821 \times 39.9 / 135746.7 = 7.296 \text{ [GJ/t]}$$

17 http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/ukr-2011-nir-08jun.zip

Annex 3

MONITORING PLAN

Please see Section D.

Annex 4

CARBON DIOXIDE EMISSION FACTORS APPLIED FOR CALCULATIONS OF THE EMISSION REDUCTIONS

Carbon dioxide emission factors are used in order to ensure accuracy and conservativeness in calculation of emission reductions generated by the Project. Only relevant studies recognized by the Ukrainian DFP and JISC were used as sources for the applied emission factors.

- Carbon dioxide emission factor for electricity consumed from the Ukrainian electricity grid:

Table 24 Carbon dioxide emission factor for consumption of electricity from the grid

Data / Parameter	***Data unit***	***Description***	***Value***	***Comment***
$EF_{CO2,ELEC,y}$	tCO_2e/ MWh	Specific emission factor of carbon dioxide for electricity consumed from the grid in year *y*	For 2008: 1.219 For 2009: 1.237 For 2010: 1.225 For 2011: 1.227	The emission factors for 2008-2011 have been issued issued by the Ukrainian DFP. The values are equal to emission factors of Ukrainian electricity grid for 2st class electricity consumption projects. The data units have been converted from $kgCO_2$/kWh into tCO_2e/MWh

The carbon dioxide emission factors for electricity consumed by the project activity, which have been applied in the Project, are Ukraine country-specific emission factors: National Environmental Investment Agency of Ukraine or NEIA (current name - State Environmental Investment Agency of Ukraine or SEIA), which is the Designated Focal Point (DFP) of Ukraine has issued values for 2008, 2009, 2010 and 2011[18]. It is envisaged that the Ukrainian DFP will issue new values of specific carbon dioxide emission factors on an annual basis, and they will be applied for emission calculations. If no new corresponding orders or values are issued, the latest emission factor will be applied.

[18] For the years 2008-2011: NEIA Orders No.62 dated 15/04/2011, No.63 dated 15/04/2011, No.43 dated 28/03/2011, and No.75 dated 12/05/2011. http://neia.gov.ua/nature/control/uk/publish/category?cat_id=111922