JOINT IMPLEMENTATION PROJECT

«Implementation of complex of energy efficiency measures and waste disposal at PJSC "SUN INBEV UKRAINE»

Position of manager of the company,
institution, establishment -developer of the document.
General Director of LLC «MT-Invest Carbon»

22.11.2012 _____ **Falendysh Yaroslav Myroslavovych**

P. for S.

Position of the head of the entity
-owner of the source,
where is planning to carry out the JI Project
Senior Country Lawyer of PJSC «SUN INBEV UKRAINE»

22.11.2012 _____ **Balakhnov Oleksandr Volodymorovych**

P. for S.

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

CONTENTS

SECTION A. General description of the project

A.1. Title of the project:

"Implementation of complex of energy efficiency measures and waste disposal at PJSC "SUN INBEV UKRAINE"

Sectoral scopes[1]:1 Energy industries (renewable - / non-renewable sources) and 13 Waste handling and disposal.

Version 04.

Date: 12/11/2012

A.2. Description of the project:

There are more than 10 years that PJSC "SUN INBEV UKRAINE" has been the undisputed leader of the Ukrainian beer market. This is a young and dynamic company that is a heir and deserved successor of centuries-old traditions of the world's largest brewer Anheuser-Busch InBev on the Ukrainian market.

In Ukraine, the company joins three breweries: Chernihiv, Kharkiv and Mykolaiv branches of "SUN INBEV UKRAINE". Chernihiv brewery "Desna" was the first to become a part of "InBev" in 1996. Then, in 1999 was a take-over of Mykolayiv brewery "Yantar". The last phase of the organization "SUN INBEV UKRAINE" was in 2000, when Kharkiv brewery "Rogan" joined to the company.

In 2006 merger of JSC "Brewery "Desna", OJSC "Brewery "Rogan" and OJSC "Brewery "Yantar" and forming of a new entity OJSC "SUN INBEV UKRAINE" took place. These works were reorganized in branch offices of OJSC "SUN INBEV UKRAINE". In 2010, at an extraordinary general meeting of shareholders of OJSC "SUN INBEV UKRAINE" it was decided to change the name on a PJSC "SUN INBEV UKRAINE".

Currently the company employs over 2,500 people.

The principles of openness and fairness with consumers and partners, and alsowith the whole society, are laid in the basis of the company's activities. One of the main targets of the company is improvement of the culture of beer consumption in the country and bringing information to the community about the product, its features, impact on human health, in the frame of the global initiative "Better World".

To estimate the performance of secure production and overall environmental efficiency, PJSC "SUN INBEV UKRAINE" has implemented the system of the internal audit to monitor the compliance of the enterprises to standards and requirements of the company "Anheuser-Busch InBev" concerning ecology matters and safety production.

During the audit, experts on Health, Safety and Environment analyze indicators reached by the enterprises, discover possible disadvantages and determine further steps of production improvement in Health, Safety and Environment directions. To estimate the state of the Health, Safety and Environment system, the company PJSC "SUN INBEV UKRAINE" involves independent experts of worldwide reputation that do not only make the assessment of the state of the Health, Safety and Environment system, but do also instruct the staff at the enterprises.

[1] http://cdm.unfccc.int/DOE/scopes.html

The main purpose of the implementation of this JI project is modernization of production, which will reduce costs of electricity and heat in the beer production, and introduction of the system of disposal of wastes from production (spent grains) which will allow to avoid methane emissions, formed through disposal of production waste at landfills.

History of the project began when, given the opportunity to attract investments through the Kyoto mechanisms, experts of PJSC "SUN INBEV UKRAINE" decided to start a large-scale modernization of beer production and an introduction of the waste disposal system (spent grains):

- Minutes of the meeting of the technical department as of 09.10.2003 (Chernihiv branch of PJSC "SUN INBEV UKRAINE");
- Order by CEO as of 05.11.2003, № 240 (Kharkiv branch of PJSC "SUN INBEV UKRAINE");
- Minutes of the technical meeting as of 15.11.2003 (Mykolaiv branch of PJSC "SUN INBEV UKRAINE").

Regarding the possibility of fund raising for production modernization under the Kyoto mechanisms, since 01.01.2004 project activities under the JI project “Implementation of complex of energy efficiency measures and waste disposal at PJSC “SUN INBEV UKRAINE” actually started. First step to realize the project was signing of agreements with stock-farms regarding disposal of production waste (spent grains) which after appropriate processing are added to livestock feed. To implement successfully the project management of PJSC “SUN INBEV UKRAINE” involved specialists of “MT-Invest Carbon” LLC. “MT-Invest Carbon” LLC is a consultant in the development of JI projects and is not a project participant. It is responsible for development of data substantiating materials, PDD, support of PJSC “SUN INBEV UKRAINE” in the process of determination, obtaining Letter of Endorsement and a Letter of Approval, support for the final determination of the project.

In the absence of activity under the Joint Implementation Project, the baseline scenario for PJSC "SUN INBEV UKRAINE" was to maintain existing at the beginning of 2004 manufacturing equipment in the appropriate condition and to export organic waste of production (spent grains) at landfills, where their anaerobic decomposition is carried out, herewith, specific energy consumption in the beer production would have remained constant at the level of 2003 and, consequently, reduction of greenhouse gas emissions in the atmosphere would not have been carried out.

This project aims to reduce greenhouse gas emissions, that are produced in result of the company’s activity through realization of 2 subprojects:

1. Reduction of specific energy consumption in the beer production

Aim of the modernization is modernization of beer production, namely: installation of highly efficient equipment and optimization of manufacturing processes that will reduce consumption of electricity and heat. Reduction of power consumption will allow to decrease power consumption from the United Energy System of Ukraine (hereinafter - UESU) that will reduce fuel consumption for electricity generation and thus reduce greenhouse gas emissions by power plants of Ukraine. Reduction of heat consumption in the production of beverages will reduce greenhouse gas emissions by decreasing the volume of natural gas combustion for heat production.

2. Production waste disposal

Purpose of this subproject is utilization of waste from production, that will allow to reduce greenhouse gas emissions into the environment, namely to reduce methane emissions, by preventing waste products disposal at landfills and, consequently, their anaerobic decomposition.

Implementation of the planned measures at the regional branches of the company “SUN InBev Ukraine” will result in reduction of energy consumption in the production and elimination of anaerobic decomposition of waste products at landfills. All the above mentioned will reduce greenhouse gas emissions into the environment.

This project is not a Joint implementation programme of activities as owner of emission reductions is the only one legal entity that is a party of the project - PJSC "SUN INBEV UKRAINE".

A.3. Project participants:

Party involved	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (Host party)	PJSC "SUN INBEV UKRAINE"	No
The Netherlands	United Carbon Finance Ltd	No
*Indicate if the Party involved is a Host party		

A.4. Technical description of the project:

A.4.1. Location of the project:

The Project is implemented within 3 regional branches that are parts of PJSC "SUN INBEV UKRAINE": Chernihiv branch of PJSC "SUN INBEV UKRAINE", Kharkiv branch of PJSC "SUN INBEV UKRAINE", Mykolaiv branch of PJSC "SUN INBEV UKRAINE". Geographical location of the Project is shown in Figure 1.

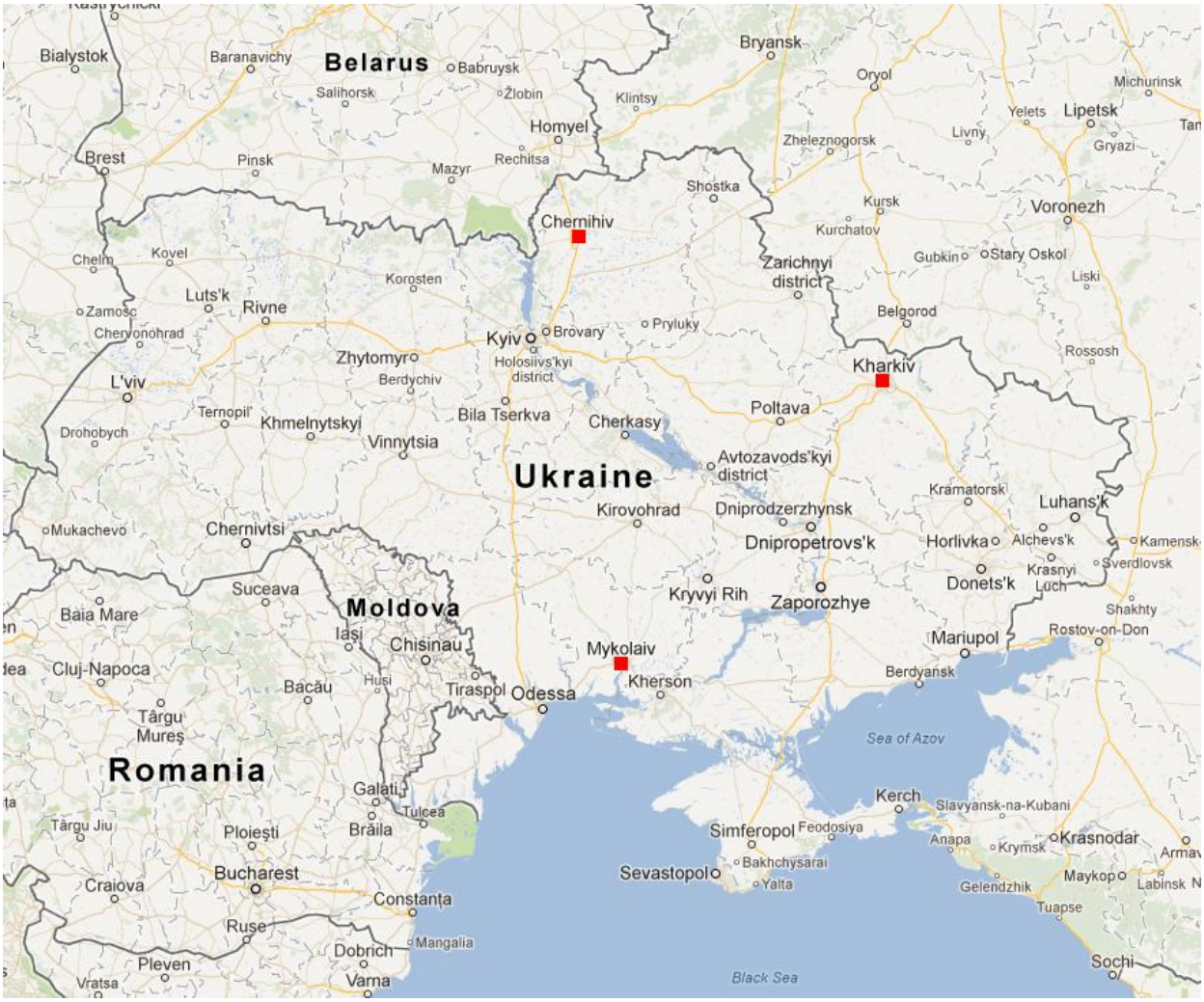

Figure 1– Geographical location of the project

Geographical location of Chernihiv branch of PJSC "SUN INBEV UKRAINE":
- 51º 52' 38" North Latitude;
- 31º 25' 11" East Longitude.

Geographical location of Kharkiv branch of PJSC "SUN INBEV UKRAINE":
- 49º 90' 79" North Latitude;
- 36º 42' 86" East Longitude.

Geographical location of Mykolaiv branch of PJSC "SUN INBEV UKRAINE":
- 46º 87' 11" North Latitude;
- 32º 06' 19" East Longitude.

A.4.1.1. Host Party(ies):

Ukraine

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

Chernihiv Region (Chernihiv branch of PJSC "SUN INBEV UKRAINE");
Kharkiv Region (Kharkiv branch of PJSC "SUN INBEV UKRAINE");
Mykolaiv Region (Mykolaiv branch of PJSC "SUN INBEV UKRAINE").

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

Chernihiv city (Chernihiv branch of PJSC "SUN INBEV UKRAINE");
Kharkiv city (Kharkiv branch of PJSC "SUN INBEV UKRAINE");
Mykolaiv city (Mykolaiv branch of PJSC "SUN INBEV UKRAINE")

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

The Project is implemented within 3 regional branches that are parts of PJSC "SUN INBEV UKRAINE": Chernihiv branch of PJSC "SUN INBEV UKRAINE", Kharkiv branch of PJSC "SUN INBEV UKRAINE", Mykolaiv branch of PJSC "SUN INBEV UKRAINE".

Production capacities location of Chernihiv branch of PJSC "SUN INBEV UKRAINE" are shown in Figure 2, of Kharkiv branch of PJSC "SUN INBEV UKRAINE" are shown in Figure 3, of Mykolaiv branch of PJSC "SUN INBEV UKRAINE" are shown in Figure 4.

Figure 2 – Production capacities location of Chernihiv branch of PJSC "SUN INBEV UKRAINE"

Figure 3 – Production capacities location of Kharkiv branch of PJSC "SUN INBEV UKRAINE"

Figure 4 – Production capacities location of Mykolaiv branch of PJSC "SUN INBEV UKRAINE"

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

Reduction of GHG emissions can be achieved through implementation of two subprojects within the framework of the suggested project:

1. Reduction of specific energy consumption in the beer production

According to the technology, production of beer requires significant volumes of consumption of electricity and heat.

Beer production process includes several stages:

- production of wort: malted and unmalted grain products are crashed, mixed with water and mashed (heated in the presence of ferments). As a result, sugars of varying complexity (glucose, maltose, dextrins) are resolved in the solution. The mash is filtered. The received mash is boiled with the addition of hop, then cooled and aerated;

- fermentation: to fermentate sugars in the mash, yeast is added; in result of the yeast activity the extract is turned into alcohol and carbon dioxide. Wasted yeast is than collected and sent to the yeast section for recuperation or drying;

- separation: separation of the yeast from young beer with help of separators and supercooling of beer in heat exchangers;

- stabilization: clarification is made, i.e. separation of all substances that lead to the turbidity of beer, occurs during the stabilization process. Stabilization occurs at low temperatures;

- filtration: filtration – the process of separation during which all the remaining waste yeast cells and turbidity particles are caught by filters;

- pasteurization: during the pasteurization beer is heated and held to maturity at high temperature; as a result all microorganisms in beer are eliminated. Current and tunnel pasteurization methods are used;

- bottling: beer is bottled in 0.5 and 0.33 liter bottles; 1-liter, 1.2-liter and 2-liter plastic bottles; 30 and 50-liter kegs; and 0.5-liter aluminum cans.

The proposed subproject will lead to lower specific consumption of electricity and heat in the process of beer production through modernization procedures at each of the regional branches of PJSC “SUN INBEV UKRAINE”.

Chernihiv branch of "SUN INBEV UKRAINE":

- replacement of NF-811 ammonia piston compressor with Grasso SB-1B screw compressor (possibility of productivity regulation from 0 to 100%; cooling capacity 1186 kW; power consumption 229 kW);
- modernization of pumping recycled water group (replacing recycled water pumps of the Czech origin (production capacity 650 m^3/hour, power consumption 22 kW) one centrifugal KSD pump of Etanorm type G 80-200 G1l of German origin was installed (production capacity 80 m^3/hour, power consumption 37 kW);
- replacement of NF-811 ammonia piston compressor with Grasso WB-1A ammonia screw compressor (possibility of productivity regulation from 0 to 100%; cooling capacity 1290 kW; power consumption 355 kW);

- modernization of carbon dioxide-air section (replacement of the existing Steinecker carbon dioxide units with productivity of 800 kg of carbon dioxide per hour with the more efficient one Haffmans carbon dioxide unit (production capacity of 1200 kg of carbon dioxide per hour; power consumption 171.47 kW). Photo of the Haffmans carbon dioxide unit is presented in the Figure 5.
- replacement of NF-811 ammonia piston compressor with Grasso TB-1B screw compressor (possibility of productivity regulation from 0 to 100%; cooling capacity 800 kW; power consumption 250 kW);
- upgrading insulation on steam pipelines (replacement and installation of insulation with modern insulation on steam mains and brewing boilers) (photo of the steam pipelines is presented in the Figure 6).

Figure 5 – Haffmans carbon dioxide unit

Figure 6 – Steam pipelines

The expected reduction of specific electricity and heat consumption at Chernihiv branch of PJSC "SUN INBEV UKRAINE" after the implementation of the mentioned measures will be 0,5 MWh/thous.dal.

The expected reduction of specific heat consumption at Chernihiv branch of PJSC "SUN INBEV UKRAINE" after the implementation of the mentioned measures will be 1,0 Gcal/thous.dal.
Schedule of implementation of the described measures is presented in the table below.

Code	Stage	Date
Ch_1	Replacement of NF-811 ammonia piston compressor with Grasso SB-1B screw compressor	30/09/2004
Ch_2	Modernization of pumping recycled water group	30/11/2004
Ch_3	Replacement of NF-811 ammonia piston compressor with Grasso WB-1A ammonia screw compressor	30/12/2005
Ch_4	Modernization of the carbon dioxide-air equipment	30/11/2006
Ch_5	Replacement of NF-811 ammonia piston compressor with Grasso TB-1B screw compressor	28/12/2007
Ch_6	Upgrading insulation on steam pipelines	30/06/2010

The expected reduction of specific electricity consumption for the beer production under the project scenario compared to the baseline scenario at the Chernihiv branch of PJSC "SUN INBEV UKRAINE" is presented in the Figure 7 below.

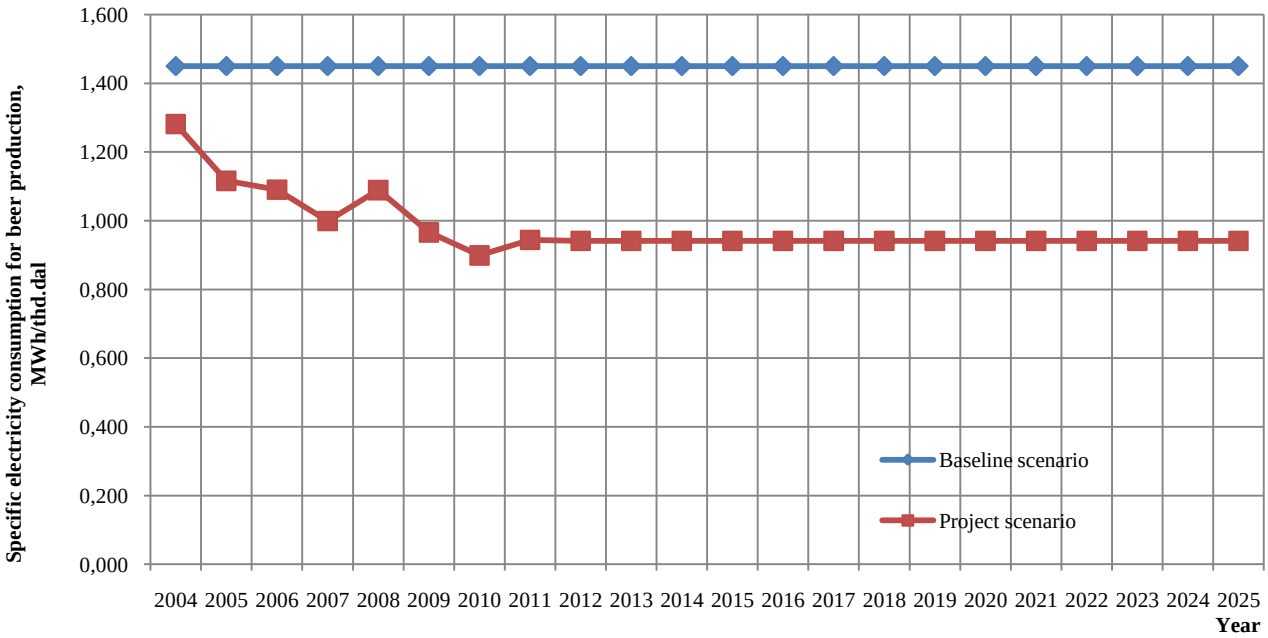

Figure 7 –The expected reduction of specific electricity consumption for the production of beer at the Chernihiv branch of PJSC "SUN INBEV UKRAINE"

The expected reduction of specific heat consumption under the project scenario compared to the baseline scenario of beer production at Chernihiv branch of PJSC "SUN INBEV UKRAINE" is presented in the Figure 8 below.

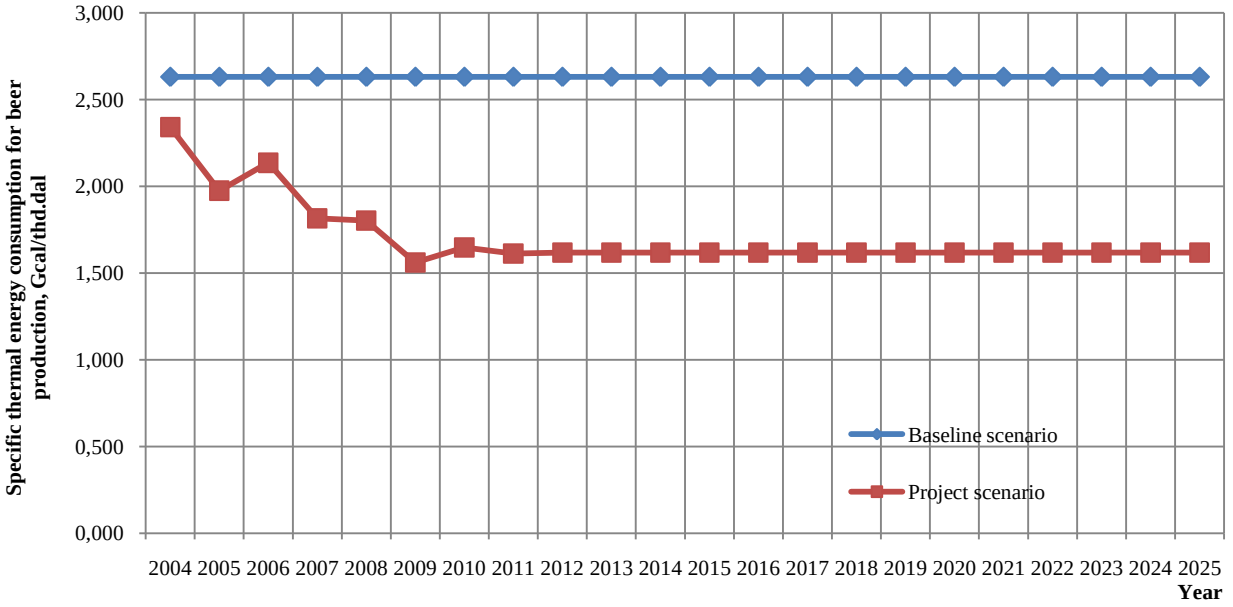

Figure 8 – The expected reduction in heat consumption in the production of beer at Chernihiv branch of PJSC "SUN INBEV UKRAINE"

Kharkiv branch of "SUN INBEV UKRAINE":

- installation of 2 Grasso RCU 912 piston ammonia compressors (possibility of productivity regulation by 25%, 50%, 75% and 100%; cooling capacity 718 kW; power consumption 250 kW) instead of 3 compressors VH-350 with 450kW each with 100% productivity;

- installation of VXC-S700 evaporative condenser (power consumption 74 kW);
- installation of VXC-S700 evaporative condenser (power consumption 74 kW), liquid separator and thermosiphon container for transferring ammonia refrigeration compressors to ammonia;
- installation of 17 new bright beer tanks (further BBT) (each BBT is equipped with a cooling jacket, which removed the need to cool the premises where BBTs were located). Photo of BBTs is presented in the Figure 9;
- installation of 14 cylinder-conical tanks (further – CCT) (each CCT is equipped with a cooling jacket with ethanol coolant, which removed the necessity to cool beer in fermentation fermenting tubs with the use of ice water and additionally to cool the premises where the fermenting tubs were located). Photo of CCTs is presented in the Figure 10;
- installation of AtlasCopco ZR-315 screw air compressor with frequency productivity regulator (production capacity 50 m^3/min; power consumption 315 kW);
- installation of Steinecker CO_2 collection and recuperation station (production capacity 1000 kg of carbon dioxide per hour; power consumption 175.8 kW);
- installation of Baltimore Aircoil (B.A.C.) cooling tower, model VXT-N310 (power consumption 74 kW) and evaporative condensers VXC-S700 and VXC-S1010 (power consumption 90 kW) instead of three-section 2VG70 film cooling tower of USSR origin (power consumption 225 kW);
- installation of two German KSB type Etanorm G 100-200 G11 centrifugal recycling water compressors (production capacity 280 m^3/hour, power consumption 55 kW) instead of recycled water pumping units (production capacity 2500 m^3/hour, power consumption 250 kW);
- installation of AtlasCopco ZT-160 screw air compressor (productivity 25 m^3/minute; power consumption 160 kW);
- installation of energy-saving unit at the brewing station (ability to optimize consumption of heat);
- installation of UNION carbon dioxide recovery unit (capacity - 2400 kg of carbon dioxide per hour; power consumption 351,6 kW);
- installation of Sierra screw compressor with frequency regulator of productivity (lower production leads to lower electricity consumption), Sierra's capacity is 50 m^3/minute at maximum power consumption of 345 kW instead of air compressors ZR-160 and ZR-315 (performance was regulated only with an unloading valve);
- installation of Grasso YB-1B screw ammonia compressor (ability to regulate productivity from 0% to 100%; cooling capacity 2000 kW; power consumption 450 kW) instead of screw ammonia compressor VH-350 by Russia (cooling capacity 450 kW; power consumption 205,5 kW);
- installation of VXC-S1010 evaporative condenser (power consumption 90 kW);
- installation of 2 Grasso YB-2B screw ammonia compressors (ability to regulate productivity from 0% to 100%; cooling capacity 1508 kW; power consumption 450 kW) instead of 2 screw ammonia compressors VH-350 by Russia (cooling capacity 450 kW; power consumption 205,5 kW);
- installation of a new additional brew house #3 (reliable insulation, ability to optimize temperature regulation).

Figure 9 – Bright Beer Tanks

Figure 10 – Cylinder-Conical Tanks

The expected reduction of specific electricity consumption at Kharkiv branch of "SUN INBEV UKRAINE" after the described measures is 0,6 MWh/thous.dal.

The expected reduction of specific heat consumption at Kharkiv branch of "SUN INBEV UKRAINE" after the described measures is 1,7 Gcal/thous. dal.

Schedule of the described measures presented in the table below.

Code	Stage name	Date of implementation
Kh_1	Installation of 2 Grasso RCU 912 piston ammonia compressors	31/07/2004
Kh_2	Installation of VXC-S700 evaporative condenser	31/07/2004
Kh_3	Installation of VXC-S700 evaporative condenser (power consumption 74 kW), liquid separator and thermosiphon container for transferring ammonia refrigeration compressors to ammonia	30/04/2005
Kh_4	Installation of 6 new BBTs	30/06/2005
Kh_5	Installation of 4 CCTs	31/07/2005
Kh_6	Installation of AtlasCopco ZR-315 screw air compressor with frequency productivity regulator	31/03/2006
Kh_7	Installation of Steinecker CO_2 collection and recuperation unit	31/03/2006
Kh_8	Installation of Baltimore Aircoil (B.A.C.) cooling tower	31/03/2006
Kh_9	Installation of VXC-S700 and VXC-S1010 evaporator	31/03/2006

	condensers	
Kh_10	Installation of two German KSB type Etanorm G 100-200 G11 centrifugal recycling water pumps	31/03/2006
Kh_11	Installation of 5 CCTs	31/08/2006
Kh_12	Installation of 3 new BBTs	31/08/2006
Kh_13	Replacement of steam condensate pipeline with modern insulation of steam pipelines	31/03/2007
Kh_14	Installation of 2 new BBTs	31/03/2007
Kh_15	Installation of AtlasCopco ZT-160 screw air compressor	31/05/2007
Kh_16	Installation of energy-saving unit at the brewing station	30/06/2007
Kh_17	Installation of 5 CCTs	31/07/2007
Kh_18	Installation of 6 new BBTs	31/07/2007
Kh_19	Installation of UNION carbon dioxide recovery unit	30/09/2007
Kh_20	Installation of Sierra screw compressor with frequency regulator of productivity	30/09/2007
Kh_21	Installation of Grasso YB-1B screw ammonia compressor	31/12/2007
Kh_22	Installation of VXC-S1010 evaporative condenser	31/12/2007
Kh_23	Installation of Grasso YB-2B screw ammonia compressor	31/12/2007
Kh_24	Installation of a new additional brew house #3	31/01/2008
Kh_25	Installation of Grasso YB-2B screw ammonia compressor	31/01/2009

The expected reduction of specific electricity consumption for the production of beer under the project scenario compared to the baseline scenario at Kharkiv branch of "SUN INBEV UKRAINE" is presented in the Figure 11 below.

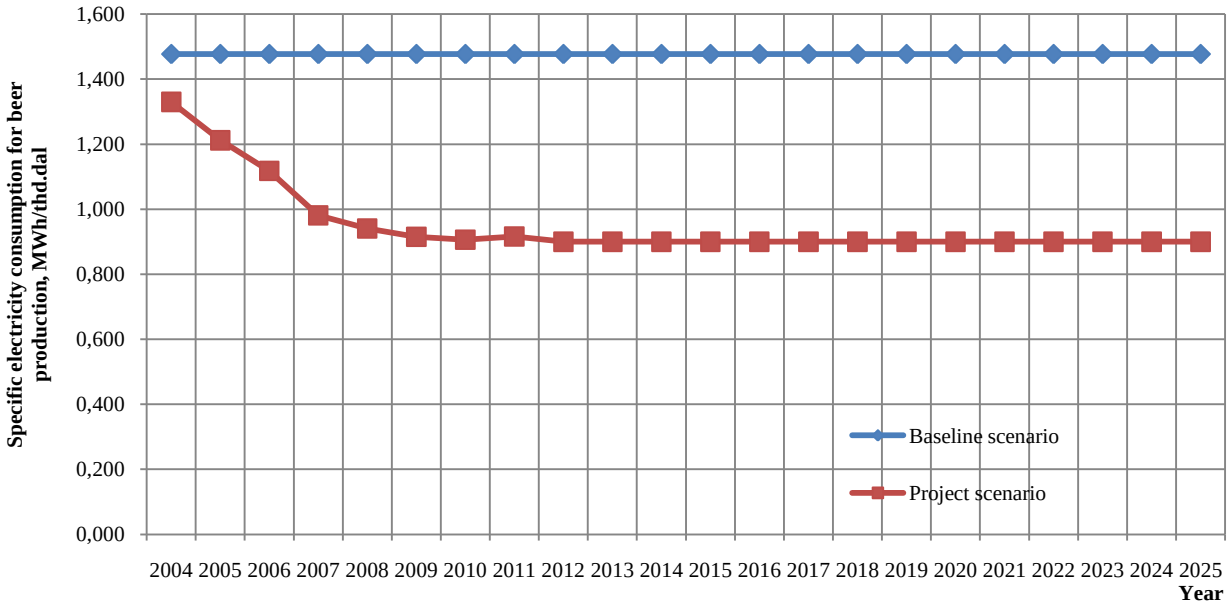

Figure 11 –The expected reduction of specific electricity consumption for the production of beer at the Kharkiv branch of PJSC "SUN INBEV UKRAINE"

The expected reduction of specific heat consumption for the beer production under the project scenario compared to the baseline scenario at Kharkiv branch of "SUN INBEV UKRAINE" is shown in the Figure 12 below.

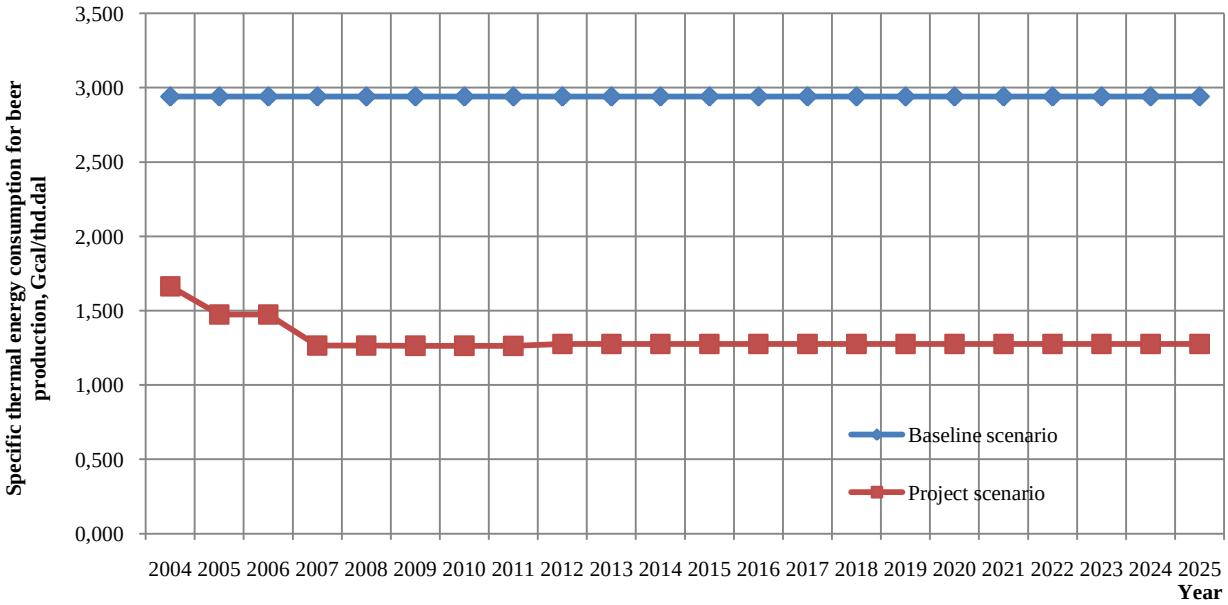

Figure 12 –The expected reduction of specific heat consumption for the production of beer at Kharkiv branch of PJSC "SUN INBEV UKRAINE"

Mykolaiv branch of "SUN INBEV UKRAINE":

- replacement of the brew kettle with a more energy efficient one (HUPPMANN) and installation of HUPPMANN evaporation condenser to heat water with steam from the brew kettle. (Photo of the HUPPMANN brew kettle is presented in the Figure 13);
- installation and insulation of "Alfa Laval" MK15-BFGR heat exchanger for heating nutrient water;
- modernization of the compressed air system (installation of the system of 6 bar compressed air pipelines for ensuring the work of the system for unloading spent grains from a separate ZR55 compressor, which will allow to reduce pressure in the factory-wide 6 bar pipeline leading to lower electricity consumption by the air-compressor station). Photo of the compressed air system is presented in the Figure 14;
- installation of "CO_2 Energy saving Evaporator unit – ReVap 2000" (for cooling warm glycol with liquid carbon dioxide, which will allow to reduce load on the glycol refrigeration-compressor station and, therefore, reduce power consumption by the refrigeration-compressor station);
- installation of the automated control system for managing the pressure of ammonia condensation in ammonia compressors of the glycol refrigeration-compressor station and refrigeration-compressor station of CCT depending on the temperature and humidity of outside air (the system automatically determines the most effective mode of operation of the refrigeration-compressor station depending on the ratio of produced cold to the consumption of electricity);
- installation of the two-phase heating mash system for brew kettles (will allow to reduce level of evaporation from brew kettles from 7% to 4% reducing the consumption of heat this way);
- installation of RECON carbon dioxide liquefaction station (developed by "Union") with productivity of 2500 kg/hour, which will allow to avoid the use of an ammonia compressor, which is used for liquefaction of carbon dioxide, as well as to avoid the use of heat condenser in the process of carbon dioxide gasification. Installation of the economizer will allow to reduce consumption of electric and heat by the carbon-dioxide compressor station.

Figure 13 – HUPPMANN brew kettle

Figure 14 – System of compressed air pipelines

The expected reduction of specific electricity consumption at Mykolaiv branch of "SUN INBEV UKRAINE" after the implementation of the described measures is 0,1 MWh/thous.dal.

The expected reduction of specific heat consumption at Mykolaiv branch of "SUN INBEV UKRAINE" after the implementation of the described measures is 1,0 Gcal/thous. dal.

Schedule of the described measures presented in the table below.

Code	Stage name	Implementation date
1	2	3
M_1	Replacement of the brew kettle with a more energy efficient one HUPPMANN brew kettle and installation of HUPPMANN evaporation condenser to heat water with steam from the brew kettle	27/06/2006
M_2	Installation and insulation of "Alfa Laval" MK15-BFGR heat exchanger for heating nutrient water	02/11/2010
M_3	Modernization of the compressed air system	17/06/2011
M_4	Installation of "CO_2 Energy saving Evaporator unit – ReVap 2000"	08/08/2011
M_5	Installation of the automated control system for managing the pressure of ammonia condensation in ammonia compressors of glycol refrigeration-compressor station and refrigeration-compressor station of CCT depending on the temperature and humidity of outside air	07/10/2011
M_6	Installation of the two-phase heating mash system for brew kettles	30/03/2012
M_7	Installation of the RECON carbon dioxide liquefaction station	09/11/2012

The expected reduction of specific electricity consumption for the production of beer under the project scenario compared to the baseline scenario at Mykolaiv branch of "SUN INBEV UKRAINE" is presented in the Figure 15 below.

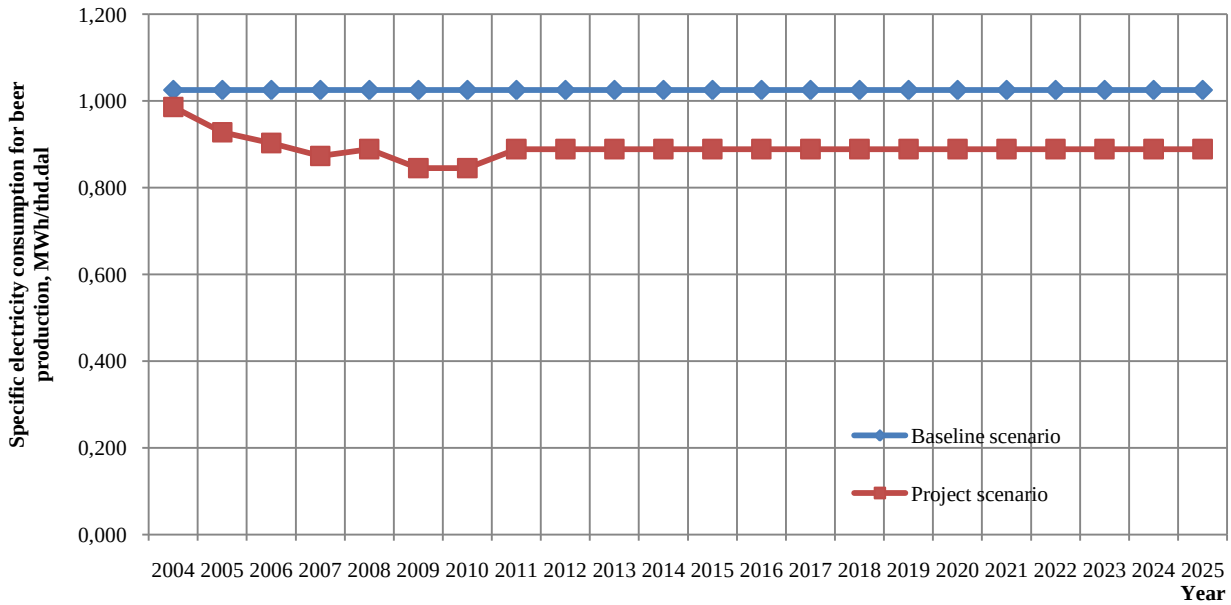

Figure 15 –The expected reduction of specific electricity consumption for the production of beer at Mykolaiv branch of PJSC "SUN INBEV UKRAINE"

The expected reduction of specific heat consumption for the beer production under the project scenario compared to the baseline scenario at the Mykolaiv branch of "SUN INBEV UKRAINE" is shown o#in Figure 16 below.

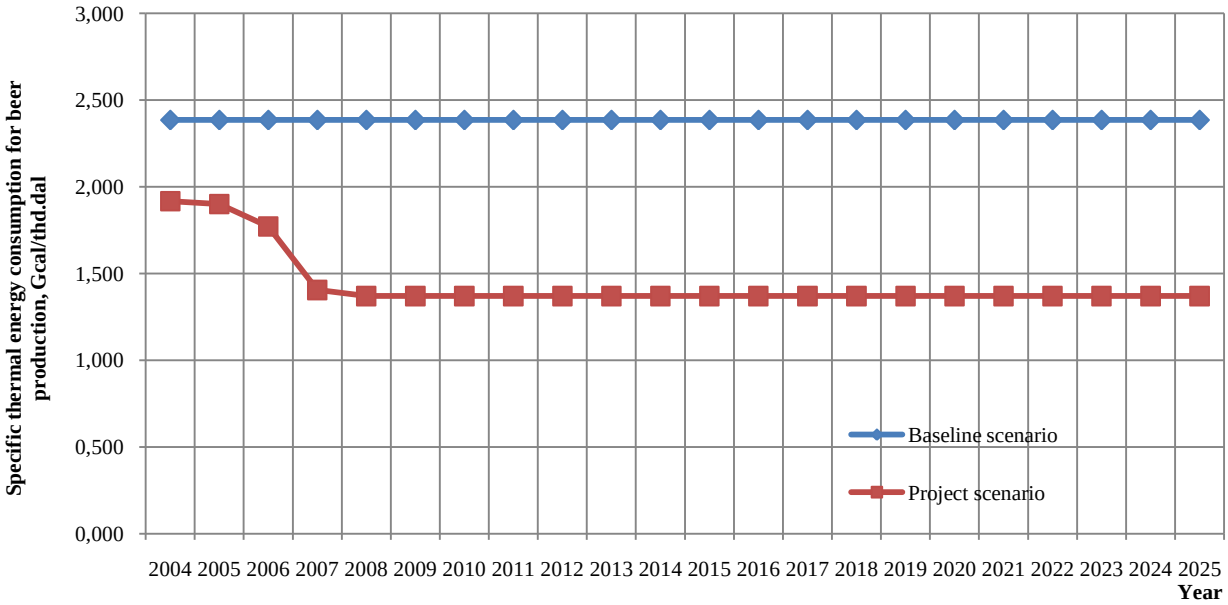

Figure 16 –The expected reduction of specific heat consumption for the production of beer at Mykolaiv branch of PJSC "SUN INBEV UKRAINE"

2. Production waste disposal

Large amount of waste is generated in the process of beer production.

The proposed subproject will allow to avoid CH4 emissions which are created in result of anaerobic decay of the production waste (spent grains) at landfills.

After the pressing out spent grains can be used as animal feed additive.

Technology of pressing of spent grains:

After pumping the mash to the press-filter, the mash is being pressed, the spent grains are washed several times with water to remove all dry substances. After the last of the washing water is removed, pressing by press-filter plates under the impact of air is carried out. Then the pressing plates open up and dry spent grains fall into a receiving container, after which the air compressor is switched on and dry spent grains are carried to the container for spent grains storing. From the storage container spent grains are transferred to stock-farms according to corresponding agreements on production waste (spent grains) disposal. Stock-farms use spent grains to add to animal feed.

The implementation of this project will allow to avoid the disposal of 95 000 to 150 000 tons of waste from the production at landfills.

Decision on implementation of the waste disposal system (spent grains) was sdefined according to the documents of regional branches of PJSC "SUN INBEV UKRAINE":

- minutes of the meeting of the technical department as of 09.10.2003 (Chernihiv branch of PJSC "SUN INBEV UKRAINE");
- order by CEO as of 05.11.2003, № 240 (Kharkiv branch of PJSC "SUN INBEV UKRAINE");
- minutes of the technical meeting as of 15.11.2003 (Mykolaiv branch of PJSC "SUN INBEV UKRAINE").

From 01.01.2004 regional branches of PJSC "SUN INBEV UKRAINE" signed contracts for the disposal of production waste (spent grains) with stock farms. Based on these agreements stock farms use spent grains as addition to livestock feed.

The main emissions of this subproject are the emissions of CH_4, which are created as a result of anaerobic decay of production waste (spent grains) at landfills. The proposed subproject will allow to reduce GHG emissions in result of recycling of production waste and, therefore, avoiding anaerobic decay at landfills.

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:

Beer production is the main activity of PJSC "SUN INBEV UKRAINE". PJSC "SUN INBEV UKRAINE" consists of three regional branches: Chernihiv, Kharkiv and Mykolaiv.

The enterprise's operations require significant energy resources. Reducing energy consumption is one of the most important issues for the enterprise with respect to nature preservation.

Large amount of waste is generated in the process of the production of drinks. Waste disposal is also an important issue for the enterprise with respect to nature preservation.

Greenhouse gas emissions under the baseline scenario are produced in the process of:
- combustion of fossil fuel (natural gas) for electricity and heat production for industrial and thermal demand needs of the enterprise;
- anaerobic decomposition of production waste (spent grains) at landfills.

Emissions reduction will succeed through implementation of 2 subprojects:

1. Reduction of specific energy consumption in the beer production.

The proposed subproject will reduce the specific consumption of electric and heat in the production of beer. Reduction of specific energy consumption will decrease volumes of electricity and heat consumption in the beer production that will reduce burning of fossil fuel for electricity and heat production by power plants in Ukraine.

2. Production waste disposal.

The proposed subproject will allow to avoid CH_4 emissions, which are created in result of anaerobic decay of the production waste (spent grains) at landfills.

Environmental legislation of Ukraine is not perfect yet, so far it has not been fully adapted to modern requirements of international environmental organizations and EU standards. There is no deliberate state policy in food industry of Ukraine that would require reduction of emissions of greenhouse gases in the atmosphere.

Currently there are no legal requirements concerning the reduction of greenhouse gas emissions for existing or new facilities, or requirements that would prohibit the placement of production waste at landfills.

All planned measures within the framework of the project require considerable financial resources for their implementation. Partly, compensation for the project realization costs is planned to be provided through reduction of energy consumption and, thus, reduction of the production costs. However, the mechanism of investment return does not grant the execution of all planed enterprise modernization measures within the project framework. The possibility of fund raising through joint implementation mechanisms allows management of the enterprise to supplement the project with those measures that may not have been financed without funds that PJSC "SUN INBEV UKRAINE" is planning to gain from emission reductions sale.

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

The beginning of the crediting period starts in 2004. Between the beginning of the crediting period until the end in 2007 Assigned Amount Units will be generated.

	Years
Length of the crediting period	4
Year	Amount of assigned amount units, t $CO_{2\,e}$
2004	102 933
2005	132 070
2006	163 196
2007	200 469
Total estimated emission reductions over the crediting period (t $CO_{2\,e}$)	598 668
Annual average of estimated emission reductions over the crediting period (t $CO_{2\,e}$)	149 667

The first commitment period under the Kyoto Protocol from 2008 to 2012:

	Years
Length of the crediting period	5
Year	Amount of emission reduction units, t $CO_{2\,e}$
2008	212 346
2009	201 782
2010	209 438
2011	217 535
2012	219 335
Total estimated emission reductions over the crediting period (t $CO_{2\,e}$)	1 060 436
Annual average of estimated emission reductions over the crediting period (t $CO_{2\,e}$)	212 087

If after the first commitment period under the Kyoto Protocol its action will be prolonged, the crediting period of the project may be extended until the end of the expected operating life cycle of the project.

	Years
Length of the crediting period	13
Year	Amount of emission reduction units, t $CO_{2\,e}$
2013	219 335
2014	219 335
2015	219 335
2016	219 335
2017	219 335
2018	219 335
2019	219 335
2020	219 335
2021	219 335
2022	219 335
2023	219 335
2024	219 335
2025	219 335
Total estimated emission reductions over the crediting period (t $CO_{2\,e}$)	2 851 355
Annual average of estimated emission reductions over the crediting period (t $CO_{2\,e}$)	219 335

A.5. Project approval by the Parties involved:

Substantiation report concerning the possible joint implementation project to receive a letter of endorsement by the owner of the emissions source owner was sent to the State environmental investment agency of Ukraine. The State Environmental Investment Agency of Ukraine issued to this project a letter of endorsement from 25.10.2012, under №3176/23/7.
After determination of the project is accomplished, the final documentation and the determination report will be presented to the State Environmental Investment Agency of Ukraine to receive a letter of approval.

SECTION B. Baseline

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

For this project baseline was chosen in accordance with the "Guidance on criteria for baseline setting and monitoring" (version 03)[1]. According to requirements of this document, selection of the baseline can be based on a specific approach that is used only for the specific JI project, or on a standard approach that provides the use of methodologies, including small, that are approved by the Executive Board of the CDM.

The chosen project specific approach is based on elements of methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 04.0.0)[2]. The similar approach was applied in determinated projects of "Obolon" company (http://ji.unfccc.int/UserManagement/FileStorage/2FPAKQRH34C6T7BNJEZWG1S9580MIX and http://ji.unfccc.int/UserManagement/FileStorage/6PI0M3HASTLOCYRQZVW95JFKN4XGBD)

As this project consists of several subprojects focused on various key factors that allow to reduce greenhouse gas emissions, then a project specific approach was chosen to set. According to "Guidance on criteria for baseline setting and monitoring" (version 03) for projects based on a specific approach it is allowed to include parts of methodologies approved by the JI Supervisory Committee to establish the baseline. To establish the baseline of this project methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 04.0.0) was used.

Choosing of the baseline is based on determining the most probable among possible for participants alternative scenarios that can ensure production of equal quality and prevent the decrease of production, and meet the requirements of the current legislation of Ukraine.

In accordance with "Guidance on criteria for baseline setting and monitoring" (version 03) to establish the baseline of the JI project the following key factors are used:

- sectoral policies and legislation (certain provisions of the legislation of Ukraine in terms of waste policy in the industry sector were used (Law of Ukraine "On Waste"[3] 05.03.1998, № 187/98-VR) and in terms of emissions of pollutants to the atmosphere (the Law of Ukraine "On protection of Atmospheric Air"[4] from 16.10.1992, № 2707 XII);
- economic situation in the industry sector (waste export to landfills is a common practice in Ukraine due to low prices and ease of utilization);
- availability of capital (implementation of the joint implementation project requires substantial financial investment and restricts access to capital);
- availability of technologies (the project implemented new technically complex equipment and to achieve its planned efficiency it requires highly skilled staff).

Under the current legislation of Ukraine reduction of greenhouse gases in the atmosphere is not compulsory. National policy of Ukraine in the field of harmful emissions into the atmosphere is governed by the Law of Ukraine "On protection of Atmospheric Air" from 16.10.1992 under №2707-XII. This law does not set specific requirements on greenhouse gas emissions in industry. Requirements for permissible emissions into air set out in the Order by the Ministry of Ecology and Natural Resources of

[1] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf
[2] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v4.0.0.pdf
[3] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=187%2F98-%E2%F0
[4] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=2707-12

Ukraine (hereinafter - Ministry of Environment in Ukraine) "On approval of permissible pollutant emissions from stationary sources"[1] as of 27.06.2006, № 309.

More detailed information on the use of the key factors for determining the baseline scenario is presented below.

The baseline scenario of this project was selected using the following steps:

1. Identification of realistic and credible alternatives;
2. Elimination of alternatives that do not meet applicable laws and regulations;
3. Elimination of alternatives that meet excessive obstacles.

Step 1. Identification of realistic and credible alternatives

To determine the baseline scenario two most likely alternatives for project activity were chosen.

Alternative 1.1	Continuation of the current situation at the enterprise
Alternative 1.2	Implementation of the project in the absence of advantages of the mechanisms of joint implementation

1.1 Continuation of the current situation at the enterprise without implementation of energy efficiency measures

According to this alternative, the company will not carry out modernization of production facilities. Waste disposal at landfills is a wide-spread practice in Ukraine owing to low costs and ease of waste disposal.

1.2 Implementation of the project in the absence of advantages of the mechanisms of joint implementation

This alternative includes the implementation of all modernization measures but without advantages of the use of joint implementation mechanisms.

Step 2. Elimination of alternatives that do not meet applicable laws and regulations

All the above mentioned alternatives do not contradict the current legislature and corresponding legal acts.

Step 3. Elimination of alternatives that meet excessive obstacles.

Sub-step 3a. Financial barriers

Alternative 1.1. does not meet significant financial obstacles as production facilities do not require modernization and the company can keep buying electricity and heat to meet its production and heating requirements. Disposal of waste at landfills is a wide-spread practice in Ukraine due to low costs.

Alternative 1.2 is not financially attractive without benefits of realization of the joint implementation mechanisms. Implementation of this alternative requires significant modernization of production

[1] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=z0912-06

facilities and financial investments that can be attracted only through a joint implementation project. The sale of spent grains is not financially attractive due to its low price.

Sub-step 3b. Technological barriers

Alternative 1.1 does not meet technological barriers as production facilities do not require modernization and can be operated with proper exploitation practices and planned repair works only. Disposal of waste at landfills is a wide-spread practice in Ukraine because of the ease of utilization of waste.

Alternative 1.2 requires significant modernization of production facilities. The project envisions installation of new technically complex equipment which in order to meet high energy efficiency indicators, requires also high qualification of service personnel. Sale of spent grains requires searching for companies that will buy it, which also requires hiring additional skilled personnel.

Establishing of the baseline

After the above described three steps were taken, it was determined that the realistic scenario, i.e. continuation of the current situation at the company without modernization envisioned by the project (alternative 1.1) is a baseline scenario for the suggested joint implementation project. Alternative 1.2 was eliminated at step 3 as an alternative that faces significant barriers (financial and technological).

To establish the baseline key parameters were selected for 2001-2003, i.e. during 3 years prior to the project activity.

To calculate the baseline emissions were used formulas are given in the following documents:
- subproject " Reduction of specific energy consumption in the beer production" - approved consolidated methodology ACM0012 " Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 4.0.0)[1] in terms of heat consumption in the production of beer and "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01)[2] as part of the electricity consumption in the production of beer;
- subproject "Production waste disposal" - "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories".

Detailed description of the calculation of baseline emissions are presented in Section D.1.1.4 of this document.

Project emissions are calculated using the following formula:

$$BE_y = \sum_{i=1}^{3} BE_{i,y},$$

BE_y – total amount of Baseline GHG emissions, t CO_{2e};
$BE_{i,y}$ – total amount of Baseline GHG emissions for the corresponding regional branch, t CO_{2e};
i – regional branch;
i=1 – Chernihiv branch of PJSC "SUN INBEV UKRAINE";
i=2 – Kharkiv branch of PJSC "SUN INBEV UKRAINE";
i=3 – Mykolaiv branch of PJSC "SUN INBEV UKRAINE".

[1] http://cdm.unfccc.int/filestorage/O/E/W/OEW5TY4BFXKIMRJ9ZDNLUC810SHV7Q/EB60_repan05_ACM0012_ver4.0.0.pdf?t=UVJ8bWRxb2NmfDBQqKvHVzZDCc284W4pAVlX
[2] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf

GHG emissions are calculated separately for each presented subproject and separately for each regional branch:

$BE_{i,y} = BE_{energy,i,y} + BE_{recovery,i,y}$,

where:
$BE_{i,y}$ – total amount of Baseline GHG emissions for the corresponding regional branch, t CO_{2e};
$BE_{energy,i,y}$ – emissions caused by energy consumption in the beer production for corresponding regional branch, t CO_{2e};
$BE_{recovery,i,y}$ – emissions caused by anaerobic decomposition of waste at landfill for the corresponding regional branch, t CO_{2e}.

1. **Reduction of specific energy consumption in the beer production.**

Calculation of emissions under this subproject is based on formulas specified in the approved consolidated methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 4.0.0) regarding heat consumption in the beer production and defined in "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01) regarding the electricity consumption in the beer production.

Baseline GHG emissions for this subproject are calculated using the next formula:

$BE_{energy,i,y} = BE_{heat,i,y} + BE_{elec,i,y}$,

where:
$BE_{energy,i,y}$ – emissions caused by energy consumption in the beer production for the corresponding regional branch, t CO_{2e};
$BE_{heat,i,y}$ – emissions caused by heat consumption in the beer production for the corresponding regional branch, t CO_{2e};
$BE_{elec,i,y}$ – emissions caused by electricity consumption in the beer production for the corresponding regional branch, t CO_{2e}.

$BE_{heat,i,y}$ is calculated using the next formula:

$BE_{heat,i,y} = 4{,}1868 \cdot HC_{BC,i} \cdot EF_{co2,NG} / \eta$,

where:
$HC_{BC,i}$ – amount of heat energy that would have been consumed in the beer production under the baseline scenario for the corresponding regional branch, Tcal;
$EF_{co2,NG}$ – emission factor for natural gas combustion, t CO_{2e}/TJ;
η – energy efficiency of boiler house, a.u.;
4,1868 – conversion factor Tcal in TJ.

$HC_{BC,i}$ is calculated using the next formula:

$HC_{BC,i} = SEC_{heat,BC,i} \cdot P_{i,y}$,

where:
$SEC_{heat,BC,i}$ – specific heat consumption in the production of beer under the baseline scenario for the corresponding regional branch, Tcal/thous. dal.

$P_{i,y}$ – amount of beer produced under the project scenario per year for the corresponding regional branch, thous. dal.

$EF_{co2,NG}$ is calculated using the next formula:

$EF_{co2,NG} = OXID_{NG} \cdot W_{NG} \cdot 44/12$,

where:
$OXID_{NG}$ – oxidation factor from natural gas combustion, a.u.;
W_{NG} – proportion of carbon in natural gas, t C/TJ.
44/12 – stoichiometric ratio between the molecular mass of carbon dioxide and carbon, t CO_{2e}/t C.

$BE_{elec,i,y}$ is calculated using the next formula:

$BE_{elec,i,y} = EC_{BC,i} \cdot EF_{co2,elec}$,

where:
$EC_{BC,i}$ – amount of electricity that would have been consumed in the beer production under the baseline scenario for the corresponding regional branch, MWh;
$EF_{co2,elec}$ – emission factor for UESU, t CO_{2e}/MWh.

$EC_{BC,i}$ is calculated using the next formula:

$EC_{BC,i} = SEC_{elec,BC,i} \cdot P_{i,y}$,

where:
$SEC_{elec,BC,i}$ – specific electricity consumption in the production of beer under the baseline scenario at the corresponding regional branch, MWh /thous. dal;
$P_{i,y}$ – amount of beer produced under the project scenario per year for corresponding regional branch, thous. dal.

2. **Production waste disposal**,

Calculation of the emissions under this subproject is based on the principles presented in "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories".

Baseline GHG emissions for this subproject are calculated using the next formula:

$BE_{recovery,i,y} = GWP_{CH4} \cdot (MSW_{T,i} \cdot MCF \cdot DOC \cdot DOC_f \cdot F \cdot 16/12 - R) \cdot (1-OX)$,

where:
GWP_{CH4} – global warming potential of methane, t CO_2/t CH_4;
$MSW_{T,i}$ amount of spent grains that is to be disposed at landfills without activities under the project at the corresponding regional branch, t;
MCF – coefficient of correction of the methane flow, a.u.;
DOC – fraction of degradable organic carbon, t C/t;
DOC_f – fraction of the degradable organic carbon that decomposes, a.u.;
F – fraction of CH_4 in landfill gas, a.u.;
R – fraction of methane utilized at landfills, t CH_4;
OX – oxidation factor, a.u.;
16/12 – molecular weight ratio, t CH_4/t C.

Key parameters for determining the baseline are presented in tables below.

Data/Parameters	η
Data unit	Arbitrary units (a.u.)
Description	Energy efficiency of boiler house
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01)[1], table 1
Value of data applied (for ex ante calculations/determinations)	0,92
Justification of the choice of data or description of measurement methods	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" requires periodic reviews and insertion of the necessary corrected data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$SEC_{heat,BC,1}$
Data unit	Gcal/thous.dal.
Description	Specific heat consumption in the production of beer under the baseline scenario at Chernihiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	2,631
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

[1] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-09-v1.pdf

Data/Parameters	$SEC_{heat,BC,2}$
Data unit	Gcal/thous. dal.
Description	Specific heat consumption in the production of beer under the baseline scenario atKharkiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to timplementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	2,941
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$SEC_{heat,BC,3}$
Data unit	Gcal/thous. dal.
Description	Specific heat consumption in the production of beer under the baseline scenario at Mykolaiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	2,385
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$P_{1,y}$
Data unit	thous.dal.
Description	Amount of beer produced under the project scenario in year *y* by Chernihiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Report on the results of fuel, heat and electricity consumption" (form №11-МТР)
Value of data applied (for ex ante calculations/determinations)	Expected volumes of produced beer are calculated based on prognosis made by the company
Justification of the choice of data or description of measurement methods	Measurement of volumes of produced beer was made with appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used for measuring is subject to periodic verification (calibration)
Any comment	-

Year	thous. dal
2004	19 186
2005	23 194
2006	26 638
2007	31 674
2008	31 259
2009	31 134
2010	30 333
2011	29 272
2012	34 000
2013	34 000
2014	34 000
2015	34 000
2016	34 000
2017	34 000
2018	34 000
2019	34 000
2020	34 000
2021	34 000
2022	34 000
2023	34 000
2024	34 000
2025	34 000

Data/Parameters	$P_{2,y}$
Data unit	thous. dal.
Description	Amount of beer produced under the project scenario in year *y* by Kharkiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)
Value of data applied (for ex ante calculations/determinations)	Expected volumes of produced beer are calculated based on prognosis made by the company
Justification of the choice of data or description of measurement methods	Measurement of volumes of produced beer was made with appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used for measuring is subject to periodic verification (calibration)
Any comment	-

Year	thous.dal.
2004	28 780
2005	35 277
2006	35 999
2007	43 918
2008	48 210
2009	44 057
2010	46 379
2011	47 656
2012	47 787
2013	47 787
2014	47 787
2015	47 787
2016	47 787
2017	47 787
2018	47 787
2019	47 787
2020	47 787
2021	47 787
2022	47 787
2023	47 787
2024	47 787
2025	47 787

Data/Parameters	$P_{3,y}$
Data unit	thous. dal.
Description	Amount of beer produced under the project scenario in year *y* by Mykolaiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)
Value of data applied (for ex ante calculations/determinations)	Expected volumes of produced beer are calculated based on prognosis made by the company

Year	thous.dal.
2004	16 893
2005	20 099
2006	30 113
2007	33 972
2008	30 056
2009	27 759
2010	27 324
2011	27 834
2012	27 000
2013	27 000
2014	27 000
2015	27 000
2016	27 000
2017	27 000
2018	27 000
2019	27 000
2020	27 000
2021	27 000
2022	27 000
2023	27 000
2024	27 000
2025	27 000

Justification of the choice of data or description of measurement methods	Measurement of volumes of produced beer was made with appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used for measuring is subject to periodic verification (calibration)
Any comment	-

Data/Parameters	$OXID_{NG}$
Data unit	Arbitrary units (a.u.)
Description	Oxidation factor from natural gas combustion
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"National inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine *for the* 1990-2010"[1] (hereinafter - "National Inventory Report, NIR of Ukraine"), table P2.30, table P2.36, table P2.42
Value of data applied (for ex ante calculations/determinations)	0,995
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

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

Data/Parameters	W_{NG}	
Data unit	t C/TJ	
Description	Proportion of carbon in natural gas	
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs	
Source of data (to be) used	NIR of Ukraine, table P2.8	
Value of data applied (for ex ante calculations/determinations)	Year	t C/TJ
	2004	15,18
	2005	15,19
	2006	15,22
	2007	15,16
	2008	15,17
	2009	15,20
	2010	15,17
	2011	15,17
	2012	15,17
	2013	15,17
	2014	15,17
	2015	15,17
	2016	15,17
	2017	15,17
	2018	15,17
	2019	15,17
	2020	15,17
	2021	15,17
	2022	15,17
	2023	15,17
	2024	15,17
	2025	15,17
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data	
QA/QC procedures (to be) applied	-	
Any comment	-	

Data/Parameters	$EF_{co2,elec}$
Data unit	t CO_{2e}/MWh
Description	Emission factor for UESU
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	2004-2005 – "Operational Guidelines for Project Design Documents of Joint Implementation Projects. Volume 1: General guidelines" (Version 2.3)[1]; 2006-2007 – Study "Standardized emission factors for the Ukrainian electricity grid" (Version 5)[2]; 2008 – Order of the National Environmental Investment Agency of Ukraine from 15.04.2011 №62[3]; 2009 – Order of the National Environmental Investment Agency of Ukraine from 15.04.2011 №63[4]; 2010 рік – of the National Environmental Investment Agency of Ukraine from 28.03.2011 №43[5]; 2011-2020 – – Order of the National Environmental Investment Agency of Ukraine from 12.05.2011 №75[6]
Value of data applied (for ex ante calculations/determinations)	0,916 – 2004; 0,896 – 2005-2007; 1,219 – 2008; 1,237 – 2009; 1,225 – 2010; 1,227 – 2011-2025
Justification of the choice of data or description of measurement methods	Researches to determine this coefficient for 2004-2005 were done by the Ministry of Economic Affairs of the Netherlands, for 2006-2007 were done by Global Carbon B.V. company and determinated by TÜV SÜD company, further researches have been carried out under the supervision of the National Environmental Investment Agency of Ukraine
QA/QC procedures (to be) applied	-
Any comment	-

[1] ji.unfccc.int/CallForInputs/BaselineSettingMonitoring/ERUPT/GuidVol1.doc
[2] http://ji.unfccc.int/UserManagement/FileStorage/46JW2KL36KM0GEMI0PHDTQF6DVI514
[3] http://www.neia.gov.ua/nature/doccatalog/document?id=127171
[4] http://www.neia.gov.ua/nature/doccatalog/document?id=127172
[5] http://www.neia.gov.ua/nature/doccatalog/document?id=126006
[6] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

Data/Parameters	$SEC_{elec,BC,1}$
Data unit	MWh/thous. dal.
Description	Specific electricity consumption for beer production under the baseline scenario at Chernihiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to the implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	1,451
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$SEC_{elec,BC,2}$
Data unit	MWh/thous. dal.
Description	Specific electricity consumption for beer production under the baseline scenario at Kharkiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to the implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	1,477
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$SEC_{elec,BC,3}$
Data unit	MWh/thous. dal.
Description	Specific electricity consumption for beer production under the baseline scenario at Mykolaiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to the implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	1,025
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	GWP_{CH4}
Data unit	t CO_2/t CH_4
Description	Global warming potential of methane
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	”Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories”[1]
Value of data applied (for ex ante calculations/determinations)	21
Justification of the choice of data or description of measurement methods	”Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories” are subject to periodic reviews and addition of necessary corrections
QA/QC procedures (to be) applied	-
Any comment	-

[1] http://www.ipcc-nggip.iges.or.jp/public/gl/russian.html

<table>
<tr><td>Data/Parameters</td><td>$MSW_{T,1}$</td></tr>
<tr><td>Data unit</td><td>t</td></tr>
<tr><td>Description</td><td>Amount of spent grains that is to be disposed at landfills without activities under the project at Chernihiv branch</td></tr>
<tr><td>Time of determination/monitoring</td><td>Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs</td></tr>
<tr><td>Source of data (to be) used</td><td>"Waste treatment" (form №1-Waste)</td></tr>
<tr><td>Value of data applied (for ex ante calculations/determinations)</td><td>Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated on the basis of the prognosis of production data made by the company
<table>
<tr><td>Year</td><td>t</td></tr>
<tr><td>2004</td><td>24 270,00</td></tr>
<tr><td>2005</td><td>25 936,00</td></tr>
<tr><td>2006</td><td>30 465,00</td></tr>
<tr><td>2007</td><td>33 637,00</td></tr>
<tr><td>2008</td><td>29 919,00</td></tr>
<tr><td>2009</td><td>31 873,00</td></tr>
<tr><td>2010</td><td>34 034,00</td></tr>
<tr><td>2011</td><td>35 744,76</td></tr>
<tr><td>2012</td><td>35 000,00</td></tr>
<tr><td>2013</td><td>35 000,00</td></tr>
<tr><td>2014</td><td>35 000,00</td></tr>
<tr><td>2015</td><td>35 000,00</td></tr>
<tr><td>2016</td><td>35 000,00</td></tr>
<tr><td>2017</td><td>35 000,00</td></tr>
<tr><td>2018</td><td>35 000,00</td></tr>
<tr><td>2019</td><td>35 000,00</td></tr>
<tr><td>2020</td><td>35 000,00</td></tr>
<tr><td>2021</td><td>35 000,00</td></tr>
<tr><td>2022</td><td>35 000,00</td></tr>
<tr><td>2023</td><td>35 000,00</td></tr>
<tr><td>2024</td><td>35 000,00</td></tr>
<tr><td>2025</td><td>35 000,00</td></tr>
</table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods</td><td>Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated with the aid of the appropriate measuring equipment</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Measuring equipment used in the process are subject to periodic testing (calibration)</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

<table>
<tr><td>Data/Parameters</td><td>$MSW_{T,2}$</td></tr>
<tr><td>Data unit</td><td>t</td></tr>
<tr><td>Description</td><td>Amount of spent grains that is to be disposed at landfills without activities under the project at Kharkiv branch</td></tr>
<tr><td>Time of determination/monitoring</td><td>Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs</td></tr>
<tr><td>Source of data (to be) used</td><td>"Waste treatment" (form №1-Waste)</td></tr>
<tr><td>Value of data applied (for ex ante calculations/determinations)</td><td>Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated on the basis of the prognosis of production data made by the company
<table>
<tr><td>Year</td><td>t</td></tr>
<tr><td>2004</td><td>43 284,00</td></tr>
<tr><td>2005</td><td>51 013,00</td></tr>
<tr><td>2006</td><td>61 703,00</td></tr>
<tr><td>2007</td><td>64 945,00</td></tr>
<tr><td>2008</td><td>68 487,00</td></tr>
<tr><td>2009</td><td>55 018,00</td></tr>
<tr><td>2010</td><td>57 261,15</td></tr>
<tr><td>2011</td><td>65 993,55</td></tr>
<tr><td>2012</td><td>66 000,00</td></tr>
<tr><td>2013</td><td>66 000,00</td></tr>
<tr><td>2014</td><td>66 000,00</td></tr>
<tr><td>2015</td><td>66 000,00</td></tr>
<tr><td>2016</td><td>66 000,00</td></tr>
<tr><td>2017</td><td>66 000,00</td></tr>
<tr><td>2018</td><td>66 000,00</td></tr>
<tr><td>2019</td><td>66 000,00</td></tr>
<tr><td>2020</td><td>66 000,00</td></tr>
<tr><td>2021</td><td>66 000,00</td></tr>
<tr><td>2022</td><td>66 000,00</td></tr>
<tr><td>2023</td><td>66 000,00</td></tr>
<tr><td>2024</td><td>66 000,00</td></tr>
<tr><td>2025</td><td>66 000,00</td></tr>
</table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods</td><td>Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated with the aid of the appropriate measuring equipment</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Measuring equipment used in the process are subject to periodic testing (calibration)</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

Data/Parameters	$MSW_{T,3}$
Data unit	t
Description	Amount of spent grains that is to be disposed at landfills without activities under the project at Mykolaiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Waste treatment" (form №1-Waste)
Value of data applied (for ex ante calculations/determinations)	Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated on the basis of the prognosis of production data made by the company

Year	t
2004	31 900,00
2005	37 411,00
2006	49 524,76
2007	56 897,55
2008	53 586,21
2009	46 803,21
2010	47 444,40
2011	49 836,50
2012	47 000,00
2013	47 000,00
2014	47 000,00
2015	47 000,00
2016	47 000,00
2017	47 000,00
2018	47 000,00
2019	47 000,00
2020	47 000,00
2021	47 000,00
2022	47 000,00
2023	47 000,00
2024	47 000,00
2025	47 000,00

Justification of the choice of data or description of measurement methods	Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated with the aid of the appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used in the process are subject to periodic testing (calibration)
Any comment	-

Data/Parameters	MCF		
Data unit	Arbitrary units (a.u.)		
Description	Coefficient of correction of the methane flow		
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs		
Source of data (to be) used	"NIR of Ukraine", table P3.5.2		
Value of data applied (for ex ante calculations/determinations)		Year	a.u.
		2004	0,720788
		2005	0,724200
		2006	0,723200
		2007	0,724200
		2008	0,726200
		2009	0,726000
		2010	0,726000
		2011	0,726000
		2012	0,726000
		2013	0,726000
		2014	0,726000
		2015	0,726000
		2016	0,726000
		2017	0,726000
		2018	0,726000
		2019	0,726000
		2020	0,726000
		2021	0,726000
		2022	0,726000
		2023	0,726000
		2024	0,726000
		2025	0,726000
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data		
QA/QC procedures (to be) applied	-		
Any comment	-		

Data/Parameters	DOC
Data unit	t C/t
Description	Fraction of degradable organic carbon
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", table 8.2
Value of data applied (for ex ante calculations/determinations)	0,15
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	DOC_f
Data unit	Arbitrary units (a.u.)
Description	Fraction of the degradable organic carbon that decomposes
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", p.295
Value of data applied (for ex ante calculations/determinations)	0,55
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	F
Data unit	Arbitrary units (a.u.)
Description	Fraction of CH_4 in landfill gas
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", p.295
Value of data applied (for ex ante calculations/determinations)	0,5
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	R
Data unit	t CH_4
Description	Fraction of methane utilized at landfills
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", p.295
Value of data applied (for ex ante calculations/determinations)	0
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	OX
Data unit	Arbitrary units (a.u.)
Description	Oxidation factor
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", p.296
Value of data applied (for ex ante calculations/determinations)	0
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

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

Sources of emissions of this project were determined separately for each subproject. The sources of greenhouse gas emissions are:

1. Reduction of specific energy consumption in the beer production.

Sources of emissions under the baseline and project scenarios are energy companies of Ukraine that generate electricity and heat for needs of production of the regional branches of PJSC "SUN INBEV UKRAINE". Emissions reduction will be achieved through decreasing of the consumption of specific heat and electricity for production process. Reduction of heat and electricity consumption will allow to decrease the fuel consumption for heat and electricity production that will lead to the reduction of emissions of GHG to the atmosphere.

2. Production waste disposal.

Emissions under this subproject are caused by anaerobic decay of waste (spent grains) at landfills in the absence of this project. Greenhouse gas emissions reduction will be achieved through prevention of waste disposal at the landfills and, accordingly, its anaerobic decay.

It is important to note that implementation of the abovementioned measures will reduce greenhouse gas emissions to the atmosphere which could not be achieved without this project. PJSC "SUN INBEV UKRAINE" does not receive any financial benefits from reduction of greenhouse gas emissions to the atmosphere. Therefore, any reduction of harmful emissions into the atmosphere that is achieved under the JI project will be additional.

Additionality of the proposed project was evaluated under the requirements of "Guidance on criteria for baseline setting and monitoring" (version 03). The JI project specific approach was applied to assess the additionality of the proposed project, according to which the additionality was evaluated under the "Tool for demonstration and assessment of additionality" (version 06.0.0)[1]. This method provides a step by step assessment of the project's additionality.

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

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

As determined in section B.1, except for the proposed JI project there were determined 2 more alternative scenarios:
1 Continuation of the existing situation at the enterprise;
2 Implementation of the project activity without advantages of the joint implementation mechanisms.

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

All the suggested alternatives correspond to existing legal rules and regulations.

The current legislation of Ukraine does not require compulsory reduction of greenhouse gas emissions to the atmosphere. National policy of Ukraine in the field of emissions into the atmosphere is regulated by the Law of Ukraine "On protection of atmospheric air" from 16.10.1992, №2707-XII. This Law does not set specific requirements for greenhouse gas emissions in the industry. Requirements for acceptable amount of air emissions are set by the Order of the Ministry of Ecology and Natural Resources of Ukraine "On approval of pollutant emissions from stationary sources" of 27.06.2006, № 309.

Step 2. Barrier analysis

Sub-Step 2a. Identification of barriers that prevent the implementation of the JI project.

1. Financial barriers

The project activities are not financially attractive without implementation of the JI mechanisms. Realization of this alternative requires significant capital investments, that can be raised only through the JI project implementation.

Implementation of the abovementioned measures requires capital investments in the amount of € 24,059 mln including:

[1] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.0.0.pdf

Code of activity	Name of activity	Cost, €
1	2	3
Chernihiv branch of "SUN INBEV UKRAINE"		
Ch_1	Replacement of NF-811 ammonia piston compressor with Grasso SB-1B screw compressor	0,498
Ch_2	Modernization of pumping recycled water group	0,011
Ch_3	Replacement of NF-811 ammonia piston compressor with Grasso WB-1A ammonia screw compressor	0,155
Ch_4	Modernization of the carbon dioxide-air equipment	0,022
Ch_5	Replacement of NF-811 ammonia piston compressor with Grasso TB-1B screw compressor	0,963
Ch_6	Upgrading insulation on steam pipelines	0,002
Kharkiv branch of "SUN INBEV UKRAINE"		
Kh_1	Installation of 2 Grasso RCU 912 piston ammonia compressors	0,122
Kh_2	Installation of VXC-S700 evaporative condenser	0,199
Kh_3	Installation of VXC-S700 evaporative condenser (power consumption 74 kW), liquid separator and thermosiphon container for transferring ammonia refrigeration compressors to ammonia	0,100
Kh_4	Installation of 6 new BBTs	0,874
Kh_5	Installation of 4 CCTs	1,195
Kh_6	Installation of AtlasCopco ZR-315 screw air compressor with frequency productivity regulator	0,203
Kh_7	Installation of Steinecker CO_2 collection and recuperation unit	0,658
Kh_8	Installation of Baltimore Aircoil (B.A.C.) cooling stack	0,195
Kh_9	Installation of VXC-S700 and VXC-S1010 evaporator condensers	0,696
Kh_10	Installation of two German KSB type Etanorm G 100-200 G11 centrifugal recycling water compressors	0,007
Kh_11	Installation of 5 CCTs	1,866
Kh_12	Installation of 3 new BBTs	0,391
Kh_13	Replacement of steam condensate pipeline with modern insulation of steam pipelines	0,017
Kh_14	Installation of 2 new BBTs	0,347
Kh_15	Installation of AtlasCopco ZT-160 screw air compressor	0,145
Kh_16	Installation of energy-saving unit at the brewing station	0,137
Kh_17	Installation of 5 CCTs	3,970
Kh_18	Installation of 6 new BBTs	2,831
Kh_19	Installation of UNION carbon dioxide recovery unit	0,889
Kh_20	Installation of Sierra screw compressor with frequency regulator of productivity	0,179
Kh_21	Installation of Grasso YB-1B screw ammonia compressor	0,273
Kh_22	Installation of VXC-S1010 evaporative condenser	0,220
Kh_23	Installation of Grasso YB-2B screw ammonia compressor	0,273
Kh_24	Installation of a new additional brew house #3	5,198
Kh_25	Installation of Grasso YB-2B screw ammonia compressor	0,269
Mykolaiv branch of "SUN INBEV UKRAINE"		
M_1	Replacement of the brew kettle with more energy efficient HUPPMANN brew kettle and installation of HUPPMANN evaporation condenser to heat water with steam from the brew	0,310

	kettle	
M_2	Installation and insulation of "Alfa Laval" MK15-BFGR heat exchanger for heating feed water	0,022
M_3	Modernization of the compressed air system	0,022
M_4	Installation of "CO_2 Energy saving Evaporator unit – ReVap 2000"	0,111
M_5	Installation of the automated control system for managing the pressure of ammonia condensation in ammonia compressors of glycol refrigeration-compressor station and refrigeration-compressor station of CCT depending on the temperature and humidity of outside air	0,077
M_6	Installation of the two-phase heating mash system for brew kettles	0,381
M_7	Installation of RECON carbon dioxide liquefaction station	0,231
	Total	24,059

Above listed investment costs are given excluding VAT.

Regional branches of PJSC "SUN INBEV UKRAINE" have no right to freely manage financial resources without the consent of planned investments with management of the central office of PJSC "SUN INBEV UKRAINE", in other words, management of the regional branches of PJSC "SUN INBEV UKRAINE" has limited access to capital. Only the possibility of obtaining funds from the sale of emission reduction units generated by this project will persuade management of the central office of PJSC "SUN INBEV UKRAINE" to fulfill the planned project activities in full.

Access to financial resources at international level for the proposed project is extremely limited. Investment climate in Ukraine is not favourable for investments, especially in comparison with neighbour countries. Confirmation of that is the credit rating of Ukraine[1]. The credit rating of Ukraine in comparison with some neighbour European countries is given below.

Country	Current rating of the national currency	The total risk premium	*Country's risk premium*
Bulgaria	Baa2	8,63	2,63
Lithuania	Baa1	8,25	2,25
Poland	A2	7,5	1,5
Russia	Baa1	8,25	2,25
Romania	Baa3	9,00	3,00
Slovakia	A1	7,28	1,28
Hungary	Ba1	9,60	3,60
Ukraine	B2	13,50	7,50
Czech Republic	A1	7,28	1,28

Registration of the proposed project as a JI project will allow partial refund of raising funds from the sale of GHG emission reduction units and provide environmentally oriented project status.

2. Technological barriers

The project activity requires a substantial modernization of the enterprise. Under the project, the new technically complex equipment that requires highly qualified staff for attainment of the planned efficiency indicators is implemented.

[1] http://www.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xls

The complexity of the manufacturing process and the proposed measures - some of which had not had any analogues in Ukraine at the beginning of the project - does not allow to forecast accurately neither energetical nor economic results of the measures proposed within this project. The uncertainty of the results leads to additional risks for the project owner.

Sub-step 2b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

Neither financial nor technological barriers will not be a barrier for the baseline scenario. The enterprise does not need investments in modernization, so PJSC "SUN INBEV UKRAINE" may purchase energy at the state to meet its production and cogeneration needs. Under the baseline scenario, the enterprise does not need modernization and may continue using its equipment according to the appropriate guidelines on usage and carrying out repair works of routine types.

JI mechanisms will raise funding for the implementation of the planned modernization project activities, that will eliminate financial barrier for the proposed project. Attracting of highly qualified staff of leading international and Ukrainian enterprises for the project implementation, will minimize these technological barriers.

Neither financial nor technological barriers will not be an obstacle to the baseline scenario. Thus, it is concluded that the project is additional.

Step 3. Investment analysis.

Sub-step 3a: Determine appropriate analysis method

"Tool for demonstration and assessment of additionality" (version 06.0.0) foresees three options for investment analysis:

Option I. Apply simple cost analysis;
Option II. Apply investment comparison analysis;
Option III. Apply benchmark analysis.

The proposed project except for income from emission reduction units realization under the joint implementation mechanism creates other benefits, therefore Option I is not applied to this project.

The chosen baselina scenario “Continuation of the current situation at the enterprise without implementation of energy efficiency measures” does not foresee investments, therefore, Option II is not applied to this project.

Paying attention to the abovementioned, Option III was chosen as analysis method.

Sub-step 3b: Option I. Apply simple cost analysis

Not applied.

Sub-step 3b: Option II. Apply investment comparison analysis

Not applied.

Sub-step 3b: Option III. Apply benchmark analysis.

To carry out all measures to modernize the enterprise the project activity requires investments of €24,059 million.
Realization of all upgrade measures will allow to reduce energy consumption (electricity and heat) and additionally to profit from the sale of spent grains.

As the project activity started in 2004, for calculation of financial indicators baseline data at the beginning of 2004 were used:
- Rate of Hryvnia against Euro – 6,1[1];
- Interest rate on loans in foreign currency by National Bank of Ukraine - 11,5[2];
- Rate without risk - 3[3];
- Premium for equity – 6,5[3];
- Country risk premium – 6,75[4];
- Cost of electricity (average for 3 regional branches) – 0,215 UAH/kWh[5];
- Cost of heat - 70 UAH/Gcal (enterprise's data);
- Cost of spent grains - 12 UAH/T (enterprise's data).

All figures, prices, tariffs and investment costs in this document are presented excluding VAT.

The values of key parameters were selected according to the "Guidelines on the assessment of investment analysis" (version 05)[3]. According to the requirements of this document, weighted average cost of capital was calculated as average value of the cost of equity and debt capital. Accordingly, a key figure will be 13,875%.

As the model is calculated in Euro, to calculate projected energy costs and spent grains in future periods inflation rates in the Euro area in 2003 were applied. Inflation rate was 2.1%[6], therefore future energy and spent grains prices were adjusted by 2.1% per year.

Based on the abovementioned data internal rate of return (IRR) was estimated for the proposed project for the expected life of the crediting period, which amounted to 11.9%. Control point of the project is below the selected control point, it indicates that the project is not financially attractive.

During the calculation of the IRR residual value of project assets when calculating cash flow in the last year was taken into account.

Sub-step 3c: Calculation and comparison of financial indicators (only applicable to Options II and III).

Financial indicators Net Present Value (NPV) and Internal Rate of Return (IRR) were calculated for two cases: with and without the involvement of the Joint Implementation mechanism.

For calculations the discount rate of 13.875% was used, which was calculated on the sub-step 3b. The financial indicators were calculated for the period of expected crediting period.

[1] http://www.bank.gov.ua/control/uk/curmetal/currency/search?formType=searchPeriodForm&time_step=daily&currency=196&periodStartTime=01.01.2003&periodEndTime=31.12.2003&outer=table&execute=%D0%92%D0%B
[2] http://news.finance.ua/ru/orgsrc/~/1/1/341/40564
[3] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf
[4] http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem04.xls
[5] http://www.e-meter.info/tarif/index.php?ft=tarif_01_04.txt
[6] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:HICP_all-items,_annual_average_inflation_rates,_2000-2010_%28%25%29.png&filetimestamp=20120328105207

For calculation of financial indicators for the project activity with benefits from JI mechanism implementation, expected profit from the sale of emission reduction units for the price of 8 Euro per 1 ton of CO2e was calculated.

Simple payback period without implementation of JI mechanisms is 12 years, with implementation - 8 years.

Calculation of NPV and IRR for the two options is listed in the table below.

	Without implementation of JI mechanism	With implementation of JI mechanism
NPV, € mln	-1,853	8,178
IRR, %	11,9	23,7

As it can be seen from the calculations, without the use of JI mechanism the project is not attractive for investment but the use of the JI mechanism can increase its attractiveness. Thus, we can conclude that the project is additional.

Sub-step 3d: Sensitivity analysis (only applicable to Options II and III):

Profitability of the proposed project mainly depends on the cost of energy in Ukraine, i.e. sensitivity of the project depends on fluctuations in energy prices in Ukraine. So that profitability of the project without implementation of the JI mechanism reaches the level of the project under the JI mechanism, cost of energy should significantly increase. The increase in energy costs is not profitable for the company, because it will lead to a rise in production cost. During the calculation of financial indicators the possible of rise in energy prices was taken into account.

The sensitivity of the project was estimated in the range of ± 10% change in the value of energy.

	-10%	0%	+10%
NPV, € mln	-3,297	-1,853	-0,409
IRR, %	10,4	11,9	13,4

In both cases the project does not become attractive for investment, even with rise in price of energy in the future. Thus, we can conclude that the project is additional.

Step 4. Common practice analysis

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

A common practice in Ukraine due to low prices and easiness of waste recycling is the usage of technical equipment by following appropriate guidelines on usage and carrying out routine types of repair works without investing significant financial costs in modernization and then further export of production waste at landfills.

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

Similar projects that have been realized in Ukraine are implemented only at costs from investments raised from the sale of emission reduction units within JI projects.

Conclusion: The project implementation will reduce greenhouse gas emissions to the atmosphere that could not be achieved without this project. Any reduction of harmful emissions to the atmosphere that is achieved within this project will be additional.

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

The JI project boundaries were defined according to requirements of "Guidance on criteria for baseline setting and monitoring" (version 03).

Project boundaries coincide with physical boundaries of three regional branches parts of PJSC "SUN INBEV UKRAINE" and relate to the region, where these branches are located. Boundaries in which the effect of the subproject 1 on greenhouse gas emissions reduction is calculated, relate to the region where energy enterprises that generate electricity and heat for industrial and cogeneration needs of PJSC "SUN INBEV UKRAINE" are located. Boundaries in which the effect of the subproject 2 on greenhouse gas emissions reduction is calculated relate the region where landfills at which waste would have been taken out if the project wasn't implemented.

Sources of greenhouse gases are:

1. Reduction of specific energy consumption in the beer production – sources of emissions under the baseline and project scenarios are energy companies of Ukraine that generate electricity and heat for the needs of production of the regional branches of PJSC "SUN InBev Ukraine". Emissions reduction will be achieved through decreasing of consumption of specific heat and electricity for production process. Reduction of heat and electricity consumption will allow to decrease the fuel consumption for heat and electricity production that will lead to reduction of emissions of GHG to the atmosphere.

2. Production waste disposal – emissions under this subproject are caused by anaerobic decay of waste (spent grains) at the landfills in the absence of this project. Greenhouse gas emissions reduction will be achieved through prevention of waste disposal at the landfills and, accordingly, its anaerobic decay.

Under the project it is not expected that the planned activity would lead to the leakage formation.

	Source	Gas	Included?	Justification/Explanation
Baseline scenario	Energy companies of Ukraine, which produce electricity and heat for industrial purposes of regional branches of PJSC "SUN INBEV UKRAINE"	CO_2	Yes	Main source of emissions
		CH_4	No	Small volume
		N_2O	No	Small volume
	Landfills	CO_2	No	Small volume
		CH_4	Yes	Main source of emissions
		N_2O	No	Small volume
Project scenario	Energy companies of Ukraine, which produce electricity and heat for industrial purposes of regional branches of PJSC "SUN INBEV UKRAINE"	CO_2	Yes	Main source of emissions
		CH_4	No	Small volume
		N_2O	No	Small volume

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: 17/08/2012.

Name of person setting the baseline:

Enitity name:	LLC «MT-Invest Carbon» is not a project participant
Address:	Of. 2, Panasa Myrnoho str. 1
City:	Kyiv
Country:	Ukraine
Contact person:	Vasylieva Nataliya Vjacheslavivna
Title:	JI Project Manager
Phone:	+38 044 2802350
Fax:	+38 044 2802346
E-mail:	*carbon@mtinvest.com.ua*

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Starting date of this JI project is October 09, 2003. As a starting date of the project was chosen date when first decision on the project implementation was taken accroding to the minutes of the meeting of the technical department of Chernihiv branch of PJSC "SUN INBEV UKRAINE".

C.2. Expected operational lifetime of the project:

The expected lifetime of the project is estimated at least as 22 years (264 months). Operational lifetime of the project was set at a rate of lifetime of equipment that is implemented under the joint implementation project.

C.3. Length of the crediting period:

22 (twenty too) years, which are 264 (two hundred sixty four) months.

Start of the first crediting period is January 01, 2004. During the period since January 01, 2004 until December 31, 2007 Assigned Amount Units (AAUs) will be generated, which is 4 years (48 months).

Emission Reduction Units (ERUs) refer to the first commitment period under the Kyoto protocol, which is 5 years (60 months) since January 01, 2004 until December 31, 2012.

If after the first commitment period under the Kyoto Protocol its action will be extended, the crediting period may be extended until the end of the expected operational lifetime of the project, i.e. December 31, 2025.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

Monitoring plan for this project was chosen according to "Guidance on criteria for baseline setting and monitoring" (version 03). According to requirements under this document selection of a baseline scenario can be based on a project specific approach that is used only to the specific JI project or a standard approach using methodologies, including small ones, that are approved by the CDM Executive Board.

The chosen specific approach is based on the elements of consolidated methodology ACM0012 " Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 4.0.0) and " Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories". A similar approach has been previously used in determinated projects of "Obolon" company (http://ji.unfccc.int/UserManagement/FileStorage/2FPAKQRH34C6T7BNJEZWG1S9580MIX and http://ji.unfccc.int/UserManagement/FileStorage/6PI0M3HASTLOCYRQZVW95JFKN4XGBD).

Monitoring plan adopted for the suggested JI project is aimed at ensuring the availability of all the needed data to determine levels of baseline and project emissions and emission reductions caused by the implementation of the suggested JI project, information about which is presented in the above sections.

To establish the monitoring plan and the level of baseline and project scenarios, specific elements of the following documents have been used:

- subproject "Reduction of specific energy consumption in the beer production" - approved consolidated methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 4.0.0)[1] regarding heat consumption in the beer production and "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01)[2] regarding the electricity consumption in the beer production;
- subproject "Production waste disposal" - "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories".

Measuring equipment used for monitoring is included to the State Registry of Measuring Instruments of Ukraine and is subject to periodic verification or calibration.

[1] http://cdm.unfccc.int/filestorage/O/E/W/OEW5TY4BFXKIMRJ9ZDNLUC810SHV7Q/EB60_repan05_ACM0012_ver4.0.0.pdf?t=TDV8bThzZmtqfDDtJP2jlVBqrMjvjx4s1IeY

[2] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf

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

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	2	3	4	5	6	7	8	9
1.$HC_{PC,i}$	amount of heat consumed for the beer production under the project scenario for the corresponding regional branch	"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)	Tcal	m	annually	1	electronic/ paper	data must be preserved during the crediting period plus two years after the last issuance of ERUs
2. η	energy efficiency of boiler house	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01)	Arbitrary units (a.u.)	e	annually	1	electronic/ paper	ditto
3. $OXID_{NG}$	oxidation factor from natural gas combustion	"National Inventory Report of Ukraine"	Arbitrary units (a.u.)	e	annually	1	electronic/ paper	ditto
4. W_{NG}	proportion of carbon in natural gas	"National Inventory Report of Ukraine"	t C/TJ	e	annually	1	electronic/ paper	ditto
5. $EC_{PC,i}$	amount of electricity that is consumed in the beer production	"Report on the results of fuel, heat and electricity	MWh	m	annually	1	electronic/ paper	ditto

	under the baseline scenario for the corresponding regional branch	consumption" (form №11-MTP)						
6. $EF_{co2,elec}$	emission factor for UESU	"Operational Guidelines for Project Design Documents of Joint Implementation Projects. Volume 1: General guidelines" (Version 2.3), Study "Standardized emission factors for the Ukrainian electricity grid" (Version 5) and orders of the State Environmental Investment Agency of Ukraine	t CO_{2e}/MWh	e	annually	1	electronic/ paper	ditto

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 generated under the project activity are calculated as follows:

$$PE_y = \sum_{i=1}^{3} PE_{i,y}, \quad (1)$$

PE_y – total amount of emissions under the project scenario, t CO_{2e};
$PE_{i,y}$ – total amount of emissions under the project scenario for the corresponding regional branch, t CO_{2e};
i – regional branch;
i=1 – Chernihiv branch of PJSC "SUN INBEV UKRAINE";
i=2 – Kharkiv branch of PJSC "SUN INBEV UKRAINE";
i=3 – Mykolaiv branch of PJSC "SUN INBEV UKRAINE".

Emissions are calculated separately for each regional branch.

Calculation of project emissions is based on formulas specified in the approved consolidated methodology ACM0012 ""Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 4.0.0) in terms of heat consumption in the beer production and defined in the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"(Version 01) in terms of electricity consumption in the beer production.

$$PE_{i,y} = PE_{heat,i,y} + PE_{elec,i,y}, \quad (1.1)$$

where:
$PE_{i,y}$ – total amount of emissions under the project scenario for the corresponding regional branch, t CO_{2e};
$PE_{heat,i,y}$ – emissions caused by heat consumption in the beer production for the corresponding regional branch, t CO_{2e};
$PE_{elec,i,y}$ – emissions caused by electricity consumption in the beer production for the corresponding regional branch, t CO_{2e}.

$PE_{heat,i,y}$ is calculated using the formula:

$$PE_{heat,i,y} = 4{,}1868 \cdot HC_{PC,i} \cdot EF_{co2,NG}/\eta, \quad (1.1.1)$$

where:
HC_{PC} – amount of heat consumed in the beer production under the project scenario for the corresponding regional branch, Tcal;
$EF_{co2,NG}$ – emission factor for natural gas combustion, t CO_{2e}/TJ;
η – Energy efficiency of boiler house, arbitrary units;
4,1868 – conversion factor Tcal in TJ.

$EF_{co2,NG}$ is calculated using the formula:

$$EF_{co2,NG} = OXID_{NG} \cdot W_{NG} \cdot 44/12, \quad (1.1.1.1)$$

where:
$OXID_{NG}$ – oxidation factor from natural gas combustion, arbitrary units;
W_{NG} – proportion of carbon in natural gas, t C/TJ.

$PE_{elec,y}$ is calculated using the formula:

$$PE_{elec,i,y} = EC_{PC,i} \cdot EF_{co2,elec}, \quad (1.1.2)$$

where:
EC_{PC} – amount of electricity that is consumed in the beer production under the baseline scenario for the corresponding regional branch, MWh;
$EF_{co2,elec}$ – emission factor for UESU, t CO_{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
1	2	3	4	5	6	7	8	9
1. η	energy efficiency of boiler house	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01)	a.u.	e	annually	1	electronic/ paper	data must be preserved during the crediting period plus two years after the last issuance of ERUs
2. $SEC_{heat,BC,i}$	specific heat consumption in the production of beer under the baseline scenario for corresponding regional branch	fixed value based on chronological data	Tcal/thous. dal.	c	fixed value	1	electronic/ paper	ditto
3. $P_{i,y}$	amount of beer produced under the project scenario per year for corresponding regional branch	"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)	thous. dal.	m	annually	1	electronic/ paper	ditto
4. $OXID_{NG}$	oxidation factor from natural gas combustion	"National Inventory Report of Ukraine"	Arbitrary units (a.u.)	e	annually	1	electronic/ paper	ditto

5. W_{NG}	Proportion of carbon in natural gas	"National Inventory Report of Ukraine"	t C/TJ	e	annually	1	electronic/ paper	ditto
6. $EF_{co2,elec}$	emission factor for UESU	"Operational Guidelines for Project Design Documents of Joint Implementation Projects. Volume 1: General guidelines" (Version 2.3), Study "Standardized emission factors for the Ukrainian electricity grid" (Version 5) and orders of the State Environmental Investment Agency of Ukraine	t CO_{2e}/MWh	e	annually	1	electronic/ paper	ditto
7. $SEC_{elec,BC,i}$	specific electricity consumption in the production of beer under the baseline scenario at the corresponding regional branch	fixed value based on chronological data	MWh /thous. dal.	c	fixed value	1	electronic/ paper	ditto

8. GWP_{CH4}	global warming potential of methane	”Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories”	t CO_2/t CH_4	e	annually	1	electronic/ paper	ditto
9. $MSW_{T,i}$	amount of spent grains that is to be disposed at landfills without activities under the project at the corresponding regional branch	"Waste treatment" (form №1-Waste)	t	m	annually	1	electronic/ paper	ditto
10. MCF	coefficient of correction of the methane flow	“NIR of Ukraine”	a.u.	e	annually	1	electronic/ paper	ditto
11. DOC	fraction of degradable organic carbon	“NIR of Ukraine”	t C/t	e	annually	1	electronic/ paper	ditto
12. DOC_f	fraction of the degradable organic carbon that decomposes	“NIR of Ukraine”	a.u.	e	annually	1	electronic/ paper	ditto
13. F	fraction of CH_4 in landfill gas	“NIR of Ukraine”	a.u.	e	annually	1	electronic/ paper	ditto
14. R	fraction of methane utilized at landfills	“NIR of Ukraine”	t CH_4	e	annually	1	electronic/ paper	ditto
15. OX	oxidation factor	“NIR of Ukraine”	a.u.	e	annually	1	electronic/ paper	ditto

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

Project baseline emissions are calculated using the following formula:

$$BE_y = \sum_{i=1}^{3} BE_{i,y}, \quad (2)$$

BE_y – total amount of Baseline GHG emissions, t CO_{2e};
$BE_{i,y}$ – total amount of Baseline GHG emissions for the corresponding regional branch, t CO_{2e};
i – regional branch;
i=1 – Chernihiv branch of PJSC "SUN INBEV UKRAINE";
i=2 – Kharkiv branch of PJSC "SUN INBEV UKRAINE";
i=3 – Mykolaiv branch of PJSC "SUN INBEV UKRAINE".

GHG emissions are calculated separately for each presented subproject and separately for each regional branch:

$$BE_{i,y} = BE_{energy,i,y} + BE_{recovery,i,y}, \quad (2.1)$$

where:
$BE_{i,y}$ – total amount of Baseline GHG emissions for the corresponding regional branch, t CO_{2e};
$BE_{energy,i,y}$ – emissions caused by energy consumption in the beer production for corresponding regional branch, t CO_{2e};
$BE_{recovery,i,y}$ – emissions caused by anaerobic decomposition of waste at landfill for the corresponding regional branch, t CO_{2e}.

3. **Reduction of specific energy consumption in the beer production.**

Calculation of emissions under this subproject is based on formulas specified in the approved consolidated methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 4.0.0) regarding heat consumption in the beer production and defined in "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01) regarding the electricity consumption in the beer production.

Baseline GHG emissions for this subproject are calculated using the next formula:

$$BE_{energy,i,y} = BE_{heat,i,y} + BE_{elec,i,y}, \quad (2.1.1)$$

where:

$BE_{energy,i,y}$ – emissions caused by energy consumption in the beer production for the corresponding regional branch, t CO_{2e};
$BE_{heat,i,y}$ – emissions caused by heat consumption in the beer production for the corresponding regional branch, t CO_{2e};
$BE_{elec,i,y}$ – emissions caused by electricity consumption in the beer production for the corresponding regional branch, t CO_{2e}.

$BE_{heat,i,y}$ is calculated using the next formula:

$$BE_{heat,i,y} = 4,1868 \cdot HC_{BC,i} \cdot EF_{co2,NG}/\eta, \quad (2.1.1.1)$$

where:
$HC_{BC,i}$ – amount of heat energy that would have been consumed in the beer production under the baseline scenario for the corresponding regional branch, Tcal;
$EF_{co2,NG}$ – emission factor for natural gas combustion, t CO_{2e}/TJ;
η – energy efficiency of boiler house, a.u.;
4,1868 – conversion factor Tcal in TJ.

$HC_{BC,i}$ is calculated using the next formula:

$$HC_{BC,i} = SEC_{heat,BC,i} \cdot P_{i,y}, \quad (2.1.1.1.1)$$

where:
$SEC_{heat,BC,i}$ – specific heat consumption in the production of beer under the baseline scenario for the corresponding regional branch, Tcal/thous. dal.
$P_{i,y}$ – amount of beer produced under the project scenario per year for the corresponding regional branch, thous. dal.

$EF_{co2,NG}$ is calculated using the next formula:

$$EF_{co2,NG} = OXID_{NG} \cdot W_{NG} \cdot 44/12, \quad (2.1.1.1.2)$$

where:
$OXID_{NG}$ – oxidation factor from natural gas combustion, a.u.;
W_{NG} – proportion of carbon in natural gas, t C/TJ.
44/12 – stoichiometric ratio between the molecular mass of carbon dioxide and carbon, t CO_{2e}/t C.

$BE_{elec,i,y}$ is calculated using the next formula:

$BE_{elec,i,y} = EC_{BC,i} \cdot EF_{co2,elec}$, (2.1.1.2)

where:
$EC_{BC,i}$ – amount of electricity that would have been consumed in the beer production under the baseline scenario for the corresponding regional branch, MWh;
$EF_{co2,elec}$ – emission factor for UESU, t CO_{2e}/MWh.

$EC_{BC,i}$ is calculated using the next formula:

$EC_{BC,i} = SEC_{elec,BC,i} \cdot P_{i,y}$, (2.1.1.2.1)

where:
$SEC_{elec,BC,i}$ – specific electricity consumption in the production of beer under the baseline scenario at the corresponding regional branch, MWh /thous. dal;
$P_{i,y}$ – amount of beer produced under the project scenario per year for corresponding regional branch, thous. dal.

4. **Production waste disposal**.

Calculation of the emissions under this subproject is based on the principles presented in "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories".

Baseline GHG emissions for this subproject are calculated using the next formula:

$BE_{recovery,i,y} = GWP_{CH4} \cdot (MSW_{T,i} \cdot MCF \cdot DOC \cdot DOC_f \cdot F \cdot 16/12 - R) \cdot (1-OX)$, (2.1.2)

where:
GWP_{CH4} – global warming potential of methane, t CO_2/t CH_4;
$MSW_{T,i}$ amount of spent grains that is to be disposed at landfills without activities under the project at the corresponding regional branch, t;
MCF – coefficient of correction of the methane flow, a.u.;
DOC – fraction of degradable organic carbon, t C/t;
DOC_f – fraction of the degradable organic carbon that decomposes, a.u.;
F – fraction of CH_4 in landfill gas, a.u.;
R – fraction of methane utilized at landfills, t CH_4;
OX – oxidation factor, a.u.;
16/12 – molecular weight ratio, t CH_4/t C.

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

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

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:

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

No leakage emissions are expected due the project implementation.

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

This section is left blank on purpose.

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):

The annual emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y, \quad (3)$$

where:
ER_y – emission reduction under JI project per year, t CO_{2e};
BE_y – baseline emissions per year, t CO_{2e};
PE_y – project emissions per year, t CO_{2e}.
y – year for which the calculation is made.

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:

This project will allow:

- to reduce energy consumption for production purposes of PJSC "SUN INBEV UKRAINE", namely heat and electrical energy for the beer production;
- to avoid anaerobic decomposition of waste products (spent grains) at landfills.

Thus, the overall impact of the project on the environment is positive. Within the procedures carried out on request of state services, the company periodically reports on the environmental performance. The company reports on emissions of NOx, SOx and dust.
According to the order of the Ministry of ecology and natural resources of Ukraine dated as of 09.03.2006, № 108[1], the State administration of environmental resources of Chernihiv, Kharkiv and Mykolaiv regions gives permits for emissions to the corresponding regional branches of PJSC "SUN INBEV UKRAINE" after study of basis regarding volumes of pollutant emissions, prepared under the instruction approved by this order. Documents which substantiate emissions are developed by agencies, organizations and institutions that are entitled to develop such documents and are included in the relevant list of the Ministry of Ecology and Natural Resources of Ukraine.
Appropriate documentation and permits for emissions are archived and stored at the monitoring groups of each regional branch of PJSC "SUN INBEV UKRAINE".

[1] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=z0341-06

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.
1	*2*	*3*
$HC_{PC,i}$ (D.1.1.1 – 1	low	Amount of heat consumed for the beer production under the project scenario for the corresponding regional branch is determined by measuring the amount consumed at production facilities with the aid of necessary measuring equipment. Measuring equipment used in the process of measuring amount of heat is subject to periodic testing and calibration[1]
η (D.1.1.1 – 2, D.1.1.3 – 1)	low	Energy efficiency of boiler house is determined in accordance with "Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01), this document is subject to periodic reviews and addition of necessary updated data
$OXID_{NG}$ (D.1.1.1 – 3, D.1.1.3 – 4)	low	Oxidation factor from natural gas combustion gas is determined in accordance with "National Inventory Report of Ukraine", which is subject to periodic reviews and addition of updated data
W_{NG} (D.1.1.1 – 4, D.1.1.3 – 5)	low	Proportion of carbon in natural gas is determined in accordance with "National Inventory Report of Ukraine", which is subject to periodic reviews and addition of updated data
$EC_{PC,i}$ (D.1.1.1 – 5)	low	Amount of electricity that is consumed in the beer production under the baseline scenario for the corresponding regional branch is determined by measuring the amount consumed at production facilities with the aid of necessary measuring equipment. Measuring equipment used in the process of measuring amount of heat is subject to periodic testing and calibration
$EF_{co2,elec}$ (D.1.1.1 – 6, D.1.1.3 – 6)	low	Emission factor for UESU is determined in accordance with the data of "Operational Guidelines for Project Design Documents of Joint Implementation Projects. Volume 1: General guidelines" (Version 2.3), Study "Standardized emission factors for the Ukrainian electricity grid" (Version 5) and corresponding orders of the State Environmental Investment Agency of Ukraine. Studies to determine this factor are carried out annually and are set in accordance with corresponding orders
$SEC_{heat,BC,i}$ (D.1.1.3 – 2)	low	Specific heat consumption in the production of beer under the baseline scenario at each regional branch has fixed value and is determined based on chronological data on beer production over the period of three years prior to the launching of projects at the corresponding regional branch
$P_{i,y}$ (D.1.1.3 – 3)	low	Amount of beer produced under the project scenario in a year *y* for corresponding regional branch is determined by measuring the amount consumed at production facilities with the aid of necessary measuring equipment. Measuring equipment used in the process of measuring amount of heat is subject to periodic testing and calibration

[1] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=113%2F98-%E2%F0

$SEC_{elec,BC,i}$ (D.1.1.3 – 7)	low	Specific electricity consumption in the production of beer under the baseline scenario at the corresponding regional branch has fixed value and is determined based on chronological data on beer production over the period of three years prior to the launching of projects at the corresponding regional branch
GWP_{CH4} (D.1.1.3 – 8)	low	Global warming potential of methane is determined according to data from "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories", this document is subject to periodic reviews and addition of updated data
$MSW_{T,i}$ (D.1.1.3 – 9)	low	Amount of spent grains that is to be disposed at landfills without activities under the project at the corresponding regional branch is determined by measuring the amount consumed at production facilities with the aid of necessary measuring equipment. Measuring equipment used in the process of measuring amount of heat is subject to periodic testing and calibration
MCF (D.1.1.3 – 10)	low	Coefficient of correction of the methane flow is determined in accordance with "National Inventory Report of Ukraine", which is subject to periodic reviews and addition of updated data
DOC (D.1.1.3 – 11)	low	Fraction of degradable organic carbon is determined in accordance with "National Inventory Report of Ukraine", which is subject to periodic reviews and addition of updated data
DOC_f (D.1.1.3 – 12)	low	Fraction of the degradable organic carbon that decomposes is determined in accordance with "National Inventory Report of Ukraine", which is subject to periodic reviews and addition of updated data
F (D.1.1.3 – 13)	low	Fraction of CH_4 in landfill gas is determined in accordance with "National Inventory Report of Ukraine", which is subject to periodic reviews and addition of updated data
R (D.1.1.3 – 14)	low	Fraction of methane utilized at landfills is determined in accordance with "National Inventory Report of Ukraine", which is subject to periodic reviews and addition of updated data
OX (D.1.1.3 – 15)	low	Oxidation factor is determined in accordance with "National Inventory Report of Ukraine", which is subject to periodic reviews and addition of updated data

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

Data monitoring described in the section above will be carried out within the framework of general exploitation of the project aimed at implementing energy efficient equipment and waste disposal at the production facilities of PJSC "SUN INBEV UKRAINE".

The following monitoring data, presented in section D.2, are subject to a single monitoring prior to the implementation of the project and are fixed for the duration of the financing period:

- Specific heat consumption in the production of beer under the baseline scenario at the corresponding regional branch;
- Specific electricity consumption in beer production under baseline scenario at the corresponding regional branch.

All other monitoring data presented in section D.2 are subject to monitoring throughout the financing period.

Measurable monitoring data are collected by technological staff from the corresponding measuring equipment. Registration in technological journals etc. of the operational data subject to monitoring (measured data) is carried out by the technological personnel in accordance to their job descriptions. Summary data on the consumption of energy and amounts of production for a year are stated in "Report on the results of fuel, heat and electricity consumption" (form №11-MTP), data on the amount of spent grains, which has to be delivered at landfills without implementation of the project scenario is presented in "Waste treatment" document (form №1-Waste), which are official reporting documents. Copies of annual reports are sent to the monitoring group. Annual reports are the main source for data use in calculations of emission reduction units and preparation of annual monitoring reports. All monitoring data is subject to processing and storing in paper and electronic forms.

General scheme of the location of measuring equipment at all regional facilities of PJSC "SUN INBEV UKRAINE" for determining all measurable monitoring data is presented on Figure 17.

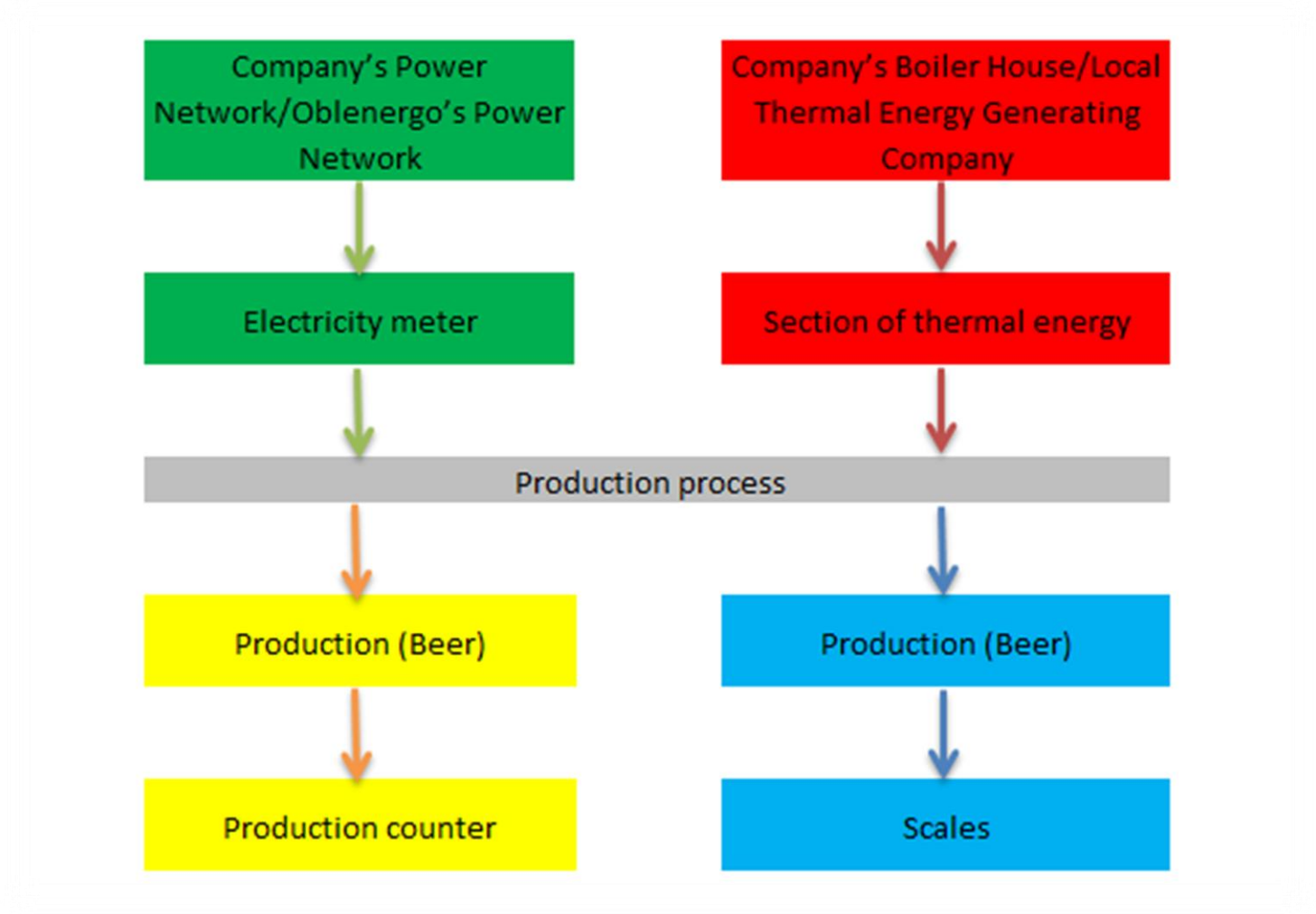

Figure 17 – Generalized layout of measuring equipment

Director of the corresponding regional branch of PJSC “SUN INBEV UKRAINE” appoints company personnel responsible for operation and maintenance of equipment used in the project. These responsibilities, among others, foresee registration of all data needed for monitoring. Monitoring group of each regional branch is headed by a technical manager of the corresponding regional branch of PJSC “SUN INBEV UKRAINE”. Monitoring will be carried out in close cooperation with technological personnel and will include monitoring itself as well as the analysis and storing of all data determined in the previous section. Organizing the work on calculating amount of emissions reduction is also a responsibility of the monitoring group. Calculation of emissions reduction is carried out by the developer of the JI project according to the order from the head of the group. Periodic monitoring data will be compared to the corresponding registered data received from the technological staff to assure its validity. In case of discrepancies, their origin has to be determined in cooperation with the technological personnel. If discrepancies are found in monitoring data, necessary corrections are to be made in the monitoring system.

All information on the monitoring and corrections of data is to be stored for the purposes of future verification of amounts of emissions reduction. The head of the monitoring group is responsible for preparation and storing of monitoring reports. Director of the corresponding regional branch is responsible for periodic analysis of the monitoring data and corresponding documents. If necessary, developer of the JI project will provide support in organization of monitoring.

Scheme of monitoring data collection and storage is presented on Figure 18.

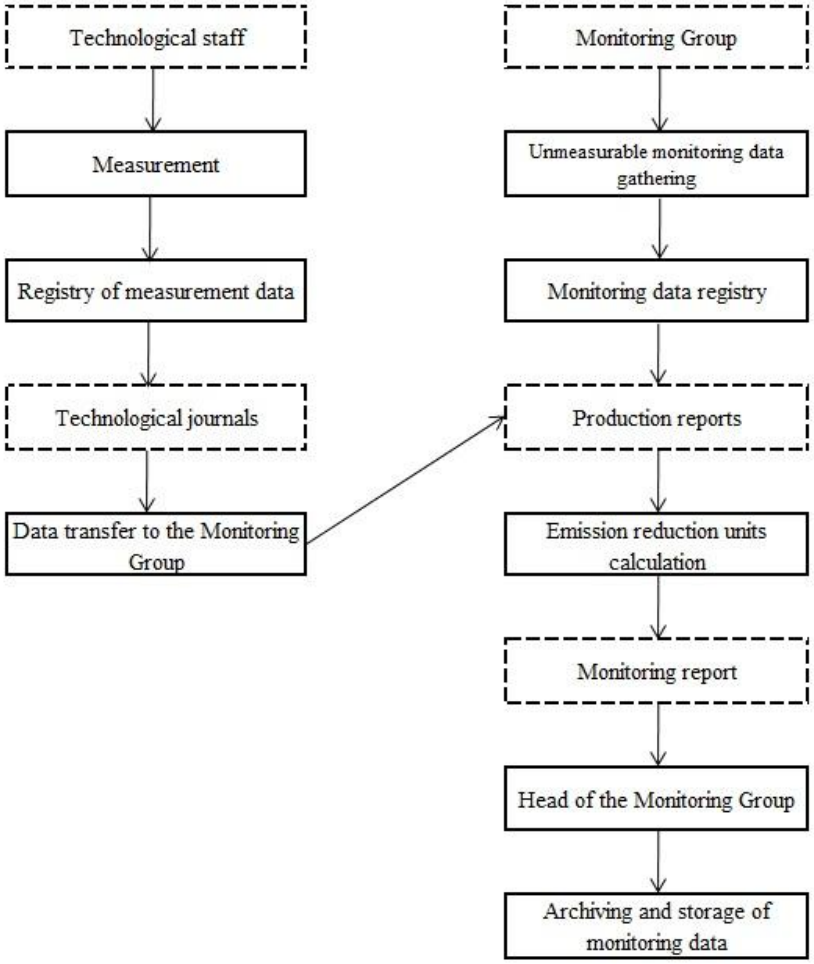

Figure 18 – Scheme of monitoring data collection and storage

Measuring and storage of measuring results is a responsibility of technological personnel. Measuring results are sent by technological personnel to the monitoring group for calculating GHG emissions reduction. Calculation of emissions reduction is done by the JI project developer on order of the group manager. The project developer is also responsible for collecting data, which are unmeasurable but are subject to monitoring. The monitoring group is responsible for preparing backup copies of the monitoring data, store backup copies in separate locations to avoid the loss of data in case of force majeure circumstances, which may lead to the loss of the main monitoring data.

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

Persons that established the monitoring plan:

Entity's name:	LLC «MT-Invest Carbon» is not a project participant
Address:	Of. 2, Panasa Myrnoho str. 1
City:	Kyiv
Country:	Ukraine
Contact person:	Vasylieva Nataliya Vjacheslavivna
Title:	Joint Implementation Project Manager
Phone:	+38 044 2802350
Fax:	+38 044 2802346
E-mail:	*carbon@mtinvest.com.ua*

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Project emissions are calculated according to the formula presented in D.1.1.2.

2004-2008:

Year	Calculated project emissions ($t CO_{2e}$)
2004	104 370
2005	112 530
2006	127 701
2007	133 962

First commitment period under the Kyoto protocol:

Year	Calculated project emissions ($t CO_{2e}$)
2008	169 263
2009	151 976
2010	149 910
2011	154 471
2012	160 009

Post-Kyoto period:

Year	Calculated project emissions ($t CO_{2e}$)
2013	160 009
2014	160 009
2015	160 009
2016	160 009
2017	160 009
2018	160 009
2019	160 009
2020	160 009
2021	160 009
2022	160 009
2023	160 009
2024	160 009
2025	160 009

E.2. Estimated leakage:

Not applicable for this project.

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

The sum of E.1. and E.2. equals to E.1.

E.4. Estimated baseline emissions:

Baseline emissions are calculated according to the formula presented in D.1.1.4.

2004-2008:

Year	Calculated baseline emissions ($t CO_{2e}$)
2004	207 303
2005	244 600
2006	290 897
2007	334 431

First commitment period under the Kyoto protocol:

Year	Calculated baseline emissions ($t CO_{2e}$)
2008	381 609
2009	353 758
2010	359 348
2011	372 006
2012	379 344

Post-Kyoto protocol:

Year	Calculated baseline emissions ($t CO_{2e}$)
2013	379 344
2014	379 344
2015	379 344
2016	379 344
2017	379 344
2018	379 344
2019	379 344
2020	379 344
2021	379 344
2022	379 344
2023	379 344
2024	379 344
2025	379 344

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

2004-2008:

Year	Calculated emissions reduction ($t CO_{2e}$)
2004	102 933
2005	132 070
2006	163 196
2007	200 469

First commitment period under the Kyoto protocol:

Year	Calculated emissions reduction ($t CO_{2e}$)
2008	212 346
2009	201 782
2010	209 438

2011	217 535
2012	219 335

Post-Kyoto protocol:

Year	Calculated emissions reduction ($t CO_{2e}$)
2013	219 335
2014	219 335
2015	219 335
2016	219 335
2017	219 335
2018	219 335
2019	219 335
2020	219 335
2021	219 335
2022	219 335
2023	219 335
2024	219 335
2025	219 335

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

2004-2008:

Year	Calculated project emissions ($t CO_{2e}$)	Calculated leakage ($t CO_{2e}$)	Calculated baseline emissions ($t CO_{2e}$)	Calculated emissions reduction ($t CO_{2e}$)
2004	104 370	0	207 303	102 933
2005	112 530	0	244 600	132 070
2006	127 701	0	290 897	163 196
2007	133 962	0	334 431	200 469
Total ($t CO_{2e}$)	478 563	0	1 077 231	598 668

First commitment period under the Kyoto protocol:

Year	Calculated project emissions ($t CO_{2e}$)	Calculated leakage ($t CO_{2e}$)	Calculated baseline emissions ($t CO_{2e}$)	Calculated emissions reduction ($t CO_{2e}$)
2008	169 263	0	381 609	212 346
2009	151 976	0	353 758	201 782
2010	149 910	0	359 348	209 438
2011	154 471	0	372 006	217 535
2012	160 009	0	379 344	219 335
Total ($t CO_{2e}$)	785 629	0	1 846 065	1 060 436

Post-Kyoto protocol:

Year	Calculated project emissions (t CO_{2e})	Calculated leakage (t CO_{2e})	Calculated baseline emissions (t CO_{2e})	Calculated emissions reduction (t CO_{2e})
2013	160 009	0	379 344	219 335
2014	160 009	0	379 344	219 335
2015	160 009	0	379 344	219 335
2016	160 009	0	379 344	219 335
2017	160 009	0	379 344	219 335
2018	160 009	0	379 344	219 335
2019	160 009	0	379 344	219 335
2020	160 009	0	379 344	219 335
2021	160 009	0	379 344	219 335
2022	160 009	0	379 344	219 335
2023	160 009	0	379 344	219 335
2024	160 009	0	379 344	219 335
2025	160 009	0	379 344	219 335
Total (t CO_{2e})	2 080 117	0	4 931 472	2 851 355

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 proposed JI project will positively affect the state of the environment due to reduction of energy consumption on production needs of PJSC "SUN INBEV UKRAINE" and owing to the introduction of production waste disposal system (spent grains) which will lead to the reduction of greenhouse gas emissions into the atmosphere.

Emissions reduction will be achieved through the implementation of this project, namely:

- the subproject "Reduction of specific energy consumption in the beer production" will reduce specific electricity and heat consumption in the beer production. Reduction of power consumption will reduce electricity and heat consumption in the beer production, which will reduce burning of fossil fuels for production of electricity and heat at power plants of Ukraine;

- the subproject "Production waste disposal" will allow to avoid emissions of CH_4 which are created in result of anaerobic decay of the production waste (spent grains) at landfills.

Emissions reduction that will be achieved through the implementation of this project impacts the environment of Ukraine and does not affect greenhouse gas emissions outside Ukraine.

Within the procedures carried out on the request of the corresponding state services, the enterprise periodically reports on environmental indicators. According to the order of the Ministry of ecology and natural resources of Ukraine dated as of 09.03.2006, № 108, the State administration of environmental resources of Chernihiv, Kharkiv and Mykolaiv regions gives permits for emissions to the corresponding regional branches of PJSC "SUN INBEV UKRAINE" after study of basis regarding volumes of pollutant emissions, prepared under the instruction approved by this order.

PJSC "SUN INBEV UKRAINE" received the following emission permits:
- Permit №7410136600-86 on air pollution emissions by stationary sources (Chernihiv branch of PJSC "SUN INBEV UKRAINE");
- Permit №6310138200-138 on air pollution emissions by stationary sources (Kharkiv branch of PJSC "SUN INBEV UKRAINE");
- Permit №4810136600-4a/P on air pollution emissions by stationary sources (Mykolaiv branch of PJSC "SUN INBEV UKRAINE").

F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to supporting documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

Implementation of the proposed project reduced air pollutant emissions from emissions sources. According to the permits issued by the State administration of environmental resources of Chernihiv, Kharkiv and Mykolaiv regions, the environmental impact is not significant, and is generally positive.

According to the current legislation of Ukraine, namely: the Law of Ukraine "On environmental protection" dated as of 25.06.1991 № 1264-XII[1] and DBN A.2.2-1[2], implementation of this project does not require any environmental assessment and correspondingly any development of the EIA.

[1] http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?page=1&nreg=1264-12

[2] DBN A.2.2-1-2003 "Structure and content of documentation on environmental impact assessment (EIA) during projection and construction of enterprises, buildings and structures"

SECTION G. Stakeholders' comments

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

Host Party does not require stakeholder consultation process for the JI project implementation.

Stakeholder comments will be collected during the period when the project is published on the stage of determination.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Project owner :

Organisation:	Chernihiv branch of PJSC "SUN INBEV UKRAINE"
Street/P.O.Box:	Instrumentalna Str.
Building:	Building 20
City:	Chernihiv
State/Region:	Chernihiv Region
Postal code:	14037
Country:	Ukraine
Phone:	+38 0462 652602
Fax:	+38 0462 651576
E-mail:	antonuna.khodachenko@beer.cn.ua
URL:	http://www.suninbev.com.ua/
Represented by:	
Title:	Technical Support Engineer
Salutation:	Mr
Last name:	Sobkiv
Middle name:	Viktorovych
First name:	Vitaliy
Department:	Technical Manager Service
Phone (direct):	+38 0462 652602
Fax (direct):	+38 0462 651576
Mobile:	+38 050 4495855
Personal e-mail:	vitaliy.sobkiv@beer.cn.ua

Organisation:	Kharkiv branch of PJSC "SUN INBEV UKRAINE"
Street/P.O.Box:	Roganska Str.
Building:	Building 161
City:	Kharkiv
State/Region:	Kharkiv Region
Postal code:	61172
Country:	Ukraine
Phone:	+38 057 7602909
Fax:	+38 057 7759202
E-mail:	sulaeva.l@rogan.kharkov.ua
URL:	http://www.suninbev.com.ua/
Represented by:	
Title:	Technical Manager
Salutation:	Mr
Last name:	Sydorenko
Middle name:	Mykhailovych
First name:	Vitaliy
Department:	Technical Manager Service
Phone (direct):	+38 057 7759228
Fax (direct):	+38 057 7759202
Mobile:	+38 050 3513927
Personal e-mail:	vitaliy.sydorenko@rogan.ua

Organisation:	Mykolaiv branch of PJSC "SUN InBev Ukraine"
Street/P.O.Box:	Yantarna Str.
Building:	Building 320
City:	Mykolaiv
State/Region:	Mykolaiv Region
Postal code:	54050
Country:	Ukraine
Phone:	+38 0512 501202
Fax:	+38 0512 501203
E-mail:	amber@beer.mk.ua
URL:	http://www.suninbev.com.ua/
Represented by:	
Title:	Technical Support Engineer
Salutation:	Mr
Last name:	Shevchenko
Middle name:	Oleksiyovych
First name:	Dmytro
Department:	Technical Service
Phone (direct):	+38 0512 501280
Fax (direct):	+38 0512 501280
Mobile:	+38 066 6078586
Personal e-mail:	shevchenko.dmitriy@beer.mk.ua

EDRPOU code: 30965655

KVED types of economic activities[1]:
15.96.0 – Beer production;
15.97.0 - Manufacture of malt;
51.34.0 – Drinks wholesale;
51.35.0 - Wholesale trade in tobacco products;
52.25.0 - Retail sale of alcoholic and other beverages;
52.26.0 - Retail tobacco.

[1] Types of economic activities in accordance with Classification of types of economic activities DK 009:2005 valid till 31/12/2012 in accordance with Order of State Committee of Ukraine on Technical Regulation and Consumery Policy No. 457 from 11/10/2010. Available at: http://zakon.nau.ua/doc/?code=v0457609-10. Last access 19/04/2012.

Buyer of project emission reduction units:

Organisation:	United Carbon Finance Ltd
Street/P.O.Box:	OMC Chambers, Wickhams Cay 1
Building:	
City:	Road Town
State/Region:	Tortola
Postal code:	
Country:	British Virgin Islands
Phone:	0038 044 4906968
Fax:	0038 044 4906925
E-mail:	
URL:	
Represented by:	
Title:	Chief Representative Officer
Salutation:	Mr
Last name:	Hajizada
Middle name:	
First name:	Kanan
Department:	
Phone (direct):	0038 099 2619300
Fax (direct):	
Mobile:	
Personal e-mail:	atumis@mail.ru

Project developer:

Organisation:	LLC "MT-Invest Carbon"
Street/P.O.Box:	Panasa Myrnoho Str.
Building:	Building 1, Office 2
City:	Kyiv
State/Region:	Kyiv Region
Postal code:	01011
Country:	Ukraine
Phone:	+38 044 2802350
Fax:	+38 044 2802346
E-mail:	carbon@mtinvest.com.ua
URL:	http://mt-invest.com.ua/
Represented by:	
Title:	Joint Implementation Project Manager
Salutation:	Ms
Last name:	Vasylieva
Middle name:	Vjacheslavivna
First name:	Nataliya
Department:	
Phone (direct):	+38 044 2802350
Fax (direct):	+38 044 2802346
Mobile:	+38 050 5277598
Personal e-mail:	nataliya.vasylieva@mtinvest.com.ua

Annex 2

BASELINE INFORMATION

The baseline scenario for this project was set in accordance with the "Guidance on criteria for baseline setting and monitoring" (Version 03). According to the document's requirements, selection of the baseline scenario can be based on a project specific approach that is implemented only for the specific JI project, or a standard approach, that foresees implementation of methodologies that are approved by CDM Executive Board, including small-scale ones.

As the project consists of several subprojects aimed at various key factors that allow to reduce GHGs emissions, at the stage of setting of the baseline scenario a project specific approach was chosen. According to the requirements of the "Guidance on criteria for baseline setting and monitoring" (Version 03), projects based on a specific approach may use specific parts of methodologies that are approved by the Joint Implementation Supervisory Committee in order to set the baseline scenario. The methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" (version 04.0.0) was used for the baseline scenario setting. Description and justification of the chosen baseline scenario is given in section B.1 of this document.

Current situation at the enterprise was adopted as the baseline scenario, i.e. activity without implementation of upgrade measures and of waste management system under the project.

The main baseline emissions are the following:

- CO_2 emissions which are created in result of electricity and heat consumption in the beer production;

- CH_4 emissions which are created in result of anaerobic decay of the production waste (spent grains) at landfills.

According to the chosen baseline scenario, the calculation of emissions was performed using a formula specified in Section D.1.1.4 of this document.

Annex 3

MONITORING PLAN

Monitoring plan for this project was set in accordance with the "Guidance on criteria for baseline setting and monitoring" (Version 03). According to the document's requirements the selection of the baseline scenario can be based on a specific approach that is used only for the specific JI project, or a standard approach, that foresees implementation of methodologies that are approved by CDM Executive Board, including small-scale ones.

Monitoring plan adopted for the proposed JI project, has as a main task to ensure the availability of all data needed to determine the emission levels under the baseline and project scenarios and accordingly volume of emissions reduction through the implementation of the proposed JI project, information on which is specified in the above sections.

The monitoring plan is specified in section D of this project

The data (parameters) to be monitored are given in the table below.

Data/Parameters	$HC_{PC,1}$
Data unit	Gcal
Description	Amount of heat consumed for the beer production under the project scenario for the Chernihiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs.
Source of data (to be) used	"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)
Value of data applied (for ex ante calculations/determinations)	The expected amount of heat energy consumed for the beer production, calculated on the basis of the projected data on production of the enterprise
Justification of the choice of data or description of measurement methods	Measurement of amount of heat energy consumed for the beer production is made with appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used for measuring is subject to periodic verification (calibration)
Any comment	-

Year	Gcal
2004	44 905
2005	45 807
2006	56 889
2007	57 483
2008	56 361
2009	48 591
2010	49 966
2011	47 178
2012	55 000
2013	55 000
2014	55 000
2015	55 000
2016	55 000
2017	55 000
2018	55 000
2019	55 000
2020	55 000
2021	55 000
2022	55 000
2023	55 000
2024	55 000
2025	55 000

<table>
<tr><td>Data/Parameters</td><td>$HC_{PC,2}$</td></tr>
<tr><td>Data unit</td><td>Gcal</td></tr>
<tr><td>Description</td><td>Amount of heat consumed for the beer production under the project scenario for the Kharkiv branch</td></tr>
<tr><td>Time of determination/monitoring</td><td>Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs.</td></tr>
<tr><td>Source of data (to be) used</td><td>"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)</td></tr>
<tr><td>Value of data applied (for ex ante calculations/determinations)</td><td>The expected amount of heat energy consumed for the beer production, calculated on the basis of the projected data on production of the enterprise
<table>
<tr><th>Year</th><th>Gcal</th></tr>
<tr><td>2004</td><td>47 852</td></tr>
<tr><td>2005</td><td>52 011</td></tr>
<tr><td>2006</td><td>53 066</td></tr>
<tr><td>2007</td><td>55 560</td></tr>
<tr><td>2008</td><td>60 990</td></tr>
<tr><td>2009</td><td>55 688</td></tr>
<tr><td>2010</td><td>58 623</td></tr>
<tr><td>2011</td><td>60 190</td></tr>
<tr><td>2012</td><td>61 000</td></tr>
<tr><td>2013</td><td>61 000</td></tr>
<tr><td>2014</td><td>61 000</td></tr>
<tr><td>2015</td><td>61 000</td></tr>
<tr><td>2016</td><td>61 000</td></tr>
<tr><td>2017</td><td>61 000</td></tr>
<tr><td>2018</td><td>61 000</td></tr>
<tr><td>2019</td><td>61 000</td></tr>
<tr><td>2020</td><td>61 000</td></tr>
<tr><td>2021</td><td>61 000</td></tr>
<tr><td>2022</td><td>61 000</td></tr>
<tr><td>2023</td><td>61 000</td></tr>
<tr><td>2024</td><td>61 000</td></tr>
<tr><td>2025</td><td>61 000</td></tr>
</table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods</td><td>Measurement of amount of heat energy consumed for the beer production is made with appropriate measuring equipment</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Measuring equipment used for measuring is subject to periodic verification (calibration)</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

<table>
<tr><td>Data/Parameters</td><td>$HC_{PC,3}$</td></tr>
<tr><td>Data unit</td><td>Gcal</td></tr>
<tr><td>Description</td><td>Amount of heat consumed for the beer production under the project scenario for the Mykolaiv branch</td></tr>
<tr><td>Time of determination/monitoring</td><td>Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs.</td></tr>
<tr><td>Source of data (to be) used</td><td>"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)</td></tr>
<tr><td>Value of data applied (for ex ante calculations/determinations)</td><td>The expected amount of heat energy consumed for the beer production, calculated on the basis of the projected data on production of the enterprise
<table>
<tr><th>Year</th><th>Gcal</th></tr>
<tr><td>2004</td><td>32 384</td></tr>
<tr><td>2005</td><td>38 202</td></tr>
<tr><td>2006</td><td>53 318</td></tr>
<tr><td>2007</td><td>47 731</td></tr>
<tr><td>2008</td><td>41 163</td></tr>
<tr><td>2009</td><td>38 017</td></tr>
<tr><td>2010</td><td>37 421</td></tr>
<tr><td>2011</td><td>38 119</td></tr>
<tr><td>2012</td><td>37 000</td></tr>
<tr><td>2013</td><td>37 000</td></tr>
<tr><td>2014</td><td>37 000</td></tr>
<tr><td>2015</td><td>37 000</td></tr>
<tr><td>2016</td><td>37 000</td></tr>
<tr><td>2017</td><td>37 000</td></tr>
<tr><td>2018</td><td>37 000</td></tr>
<tr><td>2019</td><td>37 000</td></tr>
<tr><td>2020</td><td>37 000</td></tr>
<tr><td>2021</td><td>37 000</td></tr>
<tr><td>2022</td><td>37 000</td></tr>
<tr><td>2023</td><td>37 000</td></tr>
<tr><td>2024</td><td>37 000</td></tr>
<tr><td>2025</td><td>37 000</td></tr>
</table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods</td><td>Measurement of amount of heat energy consumed for the beer production is made with appropriate measuring equipment</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Measuring equipment used for measuring is subject to periodic verification (calibration)</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

Data/Parameters	η
Data unit	Arbitrary units (a.u.)
Description	Energy efficiency of boiler house
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" (version 01), table 1
Value of data applied (for ex ante calculations/determinations)	0,92
Justification of the choice of data or description of measurement methods	"Tool to determine the baseline efficiency of thermal or electric energy generation systems" requires periodic reviews and insertion of the necessary corrected data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$OXID_{NG}$
Data unit	Arbitrary units (a.u.)
Description	Oxidation factor from natural gas combustion
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"National inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases in Ukraine *for the* 1990-2010" (hereinafter - "National Inventory Report, NIR of Ukraine"), table P2.30, table P2.36, table P2.42
Value of data applied (for ex ante calculations/determinations)	0,995
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	W_{NG}
Data unit	t C/TJ
Description	Proportion of carbon in natural gas
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	NIR of Ukraine, table P2.8
Value of data applied (for ex ante calculations/determinations)	Year: T C/TJ 2004: 15,18 2005: 15,19 2006: 15,22 2007: 15,16 2008: 15,17 2009: 15,20 2010: 15,17 2011: 15,17 2012: 15,17 2013: 15,17 2014: 15,17 2015: 15,17 2016: 15,17 2017: 15,17 2018: 15,17 2019: 15,17 2020: 15,17 2021: 15,17 2022: 15,17 2023: 15,17 2024: 15,17 2025: 15,17
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

<table>
<tr><td>Data/Parameters</td><td>$EC_{PC,1}$</td></tr>
<tr><td>Data unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Amount of electricity consumed for the beer production at the Chernihiv branch</td></tr>
<tr><td>Time of determination/monitoring</td><td>Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs</td></tr>
<tr><td>Source of data (to be) used</td><td>"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)</td></tr>
<tr><td>Value of data applied (for ex ante calculations/determinations)</td><td>The expected amount of consumed electricity for the beer production is calculated based on prognosis made by the company
<table>
<tr><th>Year</th><th>MWh</th></tr>
<tr><td>2004</td><td>24 570</td></tr>
<tr><td>2005</td><td>25 879</td></tr>
<tr><td>2006</td><td>29 031</td></tr>
<tr><td>2007</td><td>31 635</td></tr>
<tr><td>2008</td><td>34 046</td></tr>
<tr><td>2009</td><td>30 082</td></tr>
<tr><td>2010</td><td>27 258</td></tr>
<tr><td>2011</td><td>27 639</td></tr>
<tr><td>2012</td><td>32 000</td></tr>
<tr><td>2013</td><td>32 000</td></tr>
<tr><td>2014</td><td>32 000</td></tr>
<tr><td>2015</td><td>32 000</td></tr>
<tr><td>2016</td><td>32 000</td></tr>
<tr><td>2017</td><td>32 000</td></tr>
<tr><td>2018</td><td>32 000</td></tr>
<tr><td>2019</td><td>32 000</td></tr>
<tr><td>2020</td><td>32 000</td></tr>
<tr><td>2021</td><td>32 000</td></tr>
<tr><td>2022</td><td>32 000</td></tr>
<tr><td>2023</td><td>32 000</td></tr>
<tr><td>2024</td><td>32 000</td></tr>
<tr><td>2025</td><td>32 000</td></tr>
</table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods</td><td>Measurement of amount of consumed electricity for the beer production is made with appropriate measuring equipment</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Measuring equipment used for measuring is subject to periodic verification (calibration)</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

Data/Parameters	$EC_{PC,2}$
Data unit	MWh
Description	Amount of electricity consumed for the beer production at the Kharkiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)
Value of data applied (for ex ante calculations/determinations)	The expected amount of consumed electricity for the beer production is calculated based on prognosis made by the company
Justification of the choice of data or description of measurement methods	Measurement of amount of consumed electricity for the beer production is made with appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used for measuring is subject to periodic verification (calibration)
Any comment	-

Year	MWh
2004	38 285
2005	42 767
2006	40 240
2007	43 064
2008	45 344
2009	40 298
2010	42 016
2011	43 645
2012	43 000
2013	43 000
2014	43 000
2015	43 000
2016	43 000
2017	43 000
2018	43 000
2019	43 000
2020	43 000
2021	43 000
2022	43 000
2023	43 000
2024	43 000
2025	43 000

Data/Parameters	$EC_{PC,3}$
Data unit	MWh
Description	Amount of electricity consumed for the beer production at the Mykolaiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)
Value of data applied (for ex ante calculations/determinations)	The expected amount of consumed electricity for the beer production is calculated based on prognosis made by the company
Justification of the choice of data or description of measurement methods	Measurement of amount of consumed electricity for the beer production is made with appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used for measuring is subject to periodic verification (calibration)
Any comment	-

Year	MWh
2004	16 654
2005	18 659
2006	27 204
2007	29 647
2008	26 712
2009	23 448
2010	23 081
2011	24 745
2012	24 000
2013	24 000
2014	24 000
2015	24 000
2016	24 000
2017	24 000
2018	24 000
2019	24 000
2020	24 000
2021	24 000
2022	24 000
2023	24 000
2024	24 000
2025	24 000

Data/Parameters	$EF_{co2,elec}$
Data unit	t CO_{2e}/MWh
Description	Emission factor for UESU
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	2004-2005 – "Operational Guidelines for Project Design Documents of Joint Implementation Projects. Volume 1: General guidelines" (Version 2.3); 2006-2007 – Study "Standardized emission factors for the Ukrainian electricity grid" (Version 5); 2008 – Order of the National Environmental Investment Agency of Ukraine from 15.04.2011 №62; 2009 – Order of the National Environmental Investment Agency of Ukraine from 15.04.2011 №63; 2010 рік – of the National Environmental Investment Agency of Ukraine from 28.03.2011 №43; 2011-2020 – – Order of the National Environmental Investment Agency of Ukraine from 12.05.2011 №75
Value of data applied (for ex ante calculations/determinations)	0,916 – 2004; 0,896 – 2005-2007; 1,219 – 2008; 1,237 – 2009; 1,225 – 2010; 1,227 – 2011-2025
Justification of the choice of data or description of measurement methods	Researches to determine this coefficient for 2004-2005 were done by the Ministry of Economic Affairs of the Netherlands, for 2006-2007 were done by the company Global Carbon B.V. and determinated by TÜV SÜD, further researches were carried out under the supervision of the National Environmental Investment Agency of Ukraine
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$SEC_{heat,BC,1}$
Data unit	GCal/thous. dal.
Description	Specific heat consumption for beer production under the baseline scenario at the Chernihiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to the implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	2,631
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$SEC_{heat,BC,2}$
Data unit	GCal/thous. dal.
Description	Specific heat consumption for beer production under the baseline scenario at the Kharkiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to the implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	2,941
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$SEC_{heat,BC,3}$
Data unit	GCal/thous. dal.
Description	Specific heat consumption for beer production under the baseline scenario at the Mykolaiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to the implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	2,385
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

<table>
<tr><td>Data/Parameters</td><td>$P_{1,y}$</td></tr>
<tr><td>Data unit</td><td>thous. dal.</td></tr>
<tr><td>Description</td><td>Amount of beer produced under the project scenario per year at the Chernihiv branch</td></tr>
<tr><td>Time of determination/monitoring</td><td>Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs</td></tr>
<tr><td>Source of data (to be) used</td><td>"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)</td></tr>
<tr><td>Value of data applied (for ex ante calculations/determinations)</td><td>The expected amount of beer produced is calculated based on production prognosis made by the company
<table>
<tr><td>Year</td><td>thous.dal.</td></tr>
<tr><td>2004</td><td>19 186</td></tr>
<tr><td>2005</td><td>23 194</td></tr>
<tr><td>2006</td><td>26 638</td></tr>
<tr><td>2007</td><td>31 674</td></tr>
<tr><td>2008</td><td>31 259</td></tr>
<tr><td>2009</td><td>31 134</td></tr>
<tr><td>2010</td><td>30 333</td></tr>
<tr><td>2011</td><td>29 272</td></tr>
<tr><td>2012</td><td>34 000</td></tr>
<tr><td>2013</td><td>34 000</td></tr>
<tr><td>2014</td><td>34 000</td></tr>
<tr><td>2015</td><td>34 000</td></tr>
<tr><td>2016</td><td>34 000</td></tr>
<tr><td>2017</td><td>34 000</td></tr>
<tr><td>2018</td><td>34 000</td></tr>
<tr><td>2019</td><td>34 000</td></tr>
<tr><td>2020</td><td>34 000</td></tr>
<tr><td>2021</td><td>34 000</td></tr>
<tr><td>2022</td><td>34 000</td></tr>
<tr><td>2023</td><td>34 000</td></tr>
<tr><td>2024</td><td>34 000</td></tr>
<tr><td>2025</td><td>34 000</td></tr>
</table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods</td><td>Measurement of amount of consumed electricity for the beer production is made with appropriate measuring equipment</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Measuring equipment used for measuring is subject to periodic verification (calibration)</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

<table>
<tr><td>Data/Parameters</td><td>$P_{2,y}$</td></tr>
<tr><td>Data unit</td><td>thous. dal.</td></tr>
<tr><td>Description</td><td>Amount of beer produced under the project scenario per year at the Kharkiv branch</td></tr>
<tr><td>Time of determination/monitoring</td><td>Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs</td></tr>
<tr><td>Source of data (to be) used</td><td>"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)</td></tr>
<tr><td>Value of data applied (for ex ante calculations/determinations)</td><td>The expected amount of beer produced is calculated based on production prognosis made by the company
<table>
<tr><th>Year</th><th>thous.dal.</th></tr>
<tr><td>2004</td><td>28 780</td></tr>
<tr><td>2005</td><td>35 277</td></tr>
<tr><td>2006</td><td>35 999</td></tr>
<tr><td>2007</td><td>43 918</td></tr>
<tr><td>2008</td><td>48 210</td></tr>
<tr><td>2009</td><td>44 057</td></tr>
<tr><td>2010</td><td>46 379</td></tr>
<tr><td>2011</td><td>47 656</td></tr>
<tr><td>2012</td><td>47 787</td></tr>
<tr><td>2013</td><td>47 787</td></tr>
<tr><td>2014</td><td>47 787</td></tr>
<tr><td>2015</td><td>47 787</td></tr>
<tr><td>2016</td><td>47 787</td></tr>
<tr><td>2017</td><td>47 787</td></tr>
<tr><td>2018</td><td>47 787</td></tr>
<tr><td>2019</td><td>47 787</td></tr>
<tr><td>2020</td><td>47 787</td></tr>
<tr><td>2021</td><td>47 787</td></tr>
<tr><td>2022</td><td>47 787</td></tr>
<tr><td>2023</td><td>47 787</td></tr>
<tr><td>2024</td><td>47 787</td></tr>
<tr><td>2025</td><td>47 787</td></tr>
</table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods</td><td>Measurement of amount of consumed electricity for the beer production is made with appropriate measuring equipment</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Measuring equipment used for measuring is subject to periodic verification (calibration)</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

<table>
<tr><td>Data/Parameters</td><td>$P_{3,y}$</td></tr>
<tr><td>Data unit</td><td>thous. dal.</td></tr>
<tr><td>Description</td><td>Amount of beer produced under the project scenario per year at the Mykolaiv branch</td></tr>
<tr><td>Time of determination/monitoring</td><td>Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs</td></tr>
<tr><td>Source of data (to be) used</td><td>"Report on the results of fuel, heat and electricity consumption" (form №11-MTP)</td></tr>
<tr><td>Value of data applied (for ex ante calculations/determinations)</td><td>The expected amount of beer produced is calculated based on production prognosis made by the company
<table>
<tr><td>Year</td><td>thous.dal.</td></tr>
<tr><td>2004</td><td>16 893</td></tr>
<tr><td>2005</td><td>20 099</td></tr>
<tr><td>2006</td><td>30 113</td></tr>
<tr><td>2007</td><td>33 972</td></tr>
<tr><td>2008</td><td>30 056</td></tr>
<tr><td>2009</td><td>27 759</td></tr>
<tr><td>2010</td><td>27 324</td></tr>
<tr><td>2011</td><td>27 834</td></tr>
<tr><td>2012</td><td>27 000</td></tr>
<tr><td>2013</td><td>27 000</td></tr>
<tr><td>2014</td><td>27 000</td></tr>
<tr><td>2015</td><td>27 000</td></tr>
<tr><td>2016</td><td>27 000</td></tr>
<tr><td>2017</td><td>27 000</td></tr>
<tr><td>2018</td><td>27 000</td></tr>
<tr><td>2019</td><td>27 000</td></tr>
<tr><td>2020</td><td>27 000</td></tr>
<tr><td>2021</td><td>27 000</td></tr>
<tr><td>2022</td><td>27 000</td></tr>
<tr><td>2023</td><td>27 000</td></tr>
<tr><td>2024</td><td>27 000</td></tr>
<tr><td>2025</td><td>27 000</td></tr>
</table></td></tr>
<tr><td>Justification of the choice of data or description of measurement methods</td><td>Measurement of amount of consumed electricity for the beer production is made with appropriate measuring equipment</td></tr>
<tr><td>QA/QC procedures (to be) applied</td><td>Measuring equipment used for measuring is subject to periodic verification (calibration)</td></tr>
<tr><td>Any comment</td><td>-</td></tr>
</table>

Data/Parameters	$SEC_{elec,BC,1}$
Data unit	MWh/thous. dal.
Description	Specific electricity consumption for beer production under the baseline scenario at the Chernihiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to the implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	1,451
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$SEC_{elec,BC,2}$
Data unit	MWh/thous. dal.
Description	Specific electricity consumption for beer production under the baseline scenario at the Kharkiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to the implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	1,477
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$SEC_{elec,BC,3}$
Data unit	MWh/thous. dal.
Description	Specific electricity consumption for beer production under the baseline scenario at the Mykolaiv branch
Time of determination/monitoring	Fixed data. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	Fixed figure based on chronological data from beer production over the period of 3 year prior to the implementation of the project, i.e. 2001-2003
Value of data applied (for ex ante calculations/determinations)	1,025
Justification of the choice of data or description of measurement methods	Fixed data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	GWP_{CH4}
Data unit	t CO_2/t CH_4
Description	Global warming potential of methane
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	”Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories”
Value of data applied (for ex ante calculations/determinations)	21
Justification of the choice of data or description of measurement methods	”Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories” are subject to periodic reviews and addition of necessary corrections
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	$MSW_{T,1}$
Data unit	t
Description	Amount of spent grains that is to be disposed at landfills without activities under the project at the Chernihiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Waste treatment" (form №1-Waste)
Value of data applied (for ex ante calculations/determinations)	Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated on the basis of the prognosis of production data made by the company

Year	t
2004	24 270,00
2005	25 936,00
2006	30 465,00
2007	33 637,00
2008	29 919,00
2009	31 873,00
2010	34 034,00
2011	35 744,76
2012	35 000,00
2013	35 000,00
2014	35 000,00
2015	35 000,00
2016	35 000,00
2017	35 000,00
2018	35 000,00
2019	35 000,00
2020	35 000,00
2021	35 000,00
2022	35 000,00
2023	35 000,00
2024	35 000,00
2025	35 000,00

Justification of the choice of data or description of measurement methods	Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated with the aid of the appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used in the process are subject to periodic testing (calibration)
Any comment	-

Data/Parameters	$MSW_{T,2}$
Data unit	t
Description	Amount of spent grains that is to be disposed at landfills without activities under the project at the Kharkiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Waste treatment" (form №1-Waste)
Value of data applied (for ex ante calculations/determinations)	Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated on the basis of the prognosis of production data made by the company

Year	t
2004	43 284,00
2005	51 013,00
2006	61 703,00
2007	64 945,00
2008	68 487,00
2009	55 018,00
2010	57 261,15
2011	65 993,55
2012	66 000,00
2013	66 000,00
2014	66 000,00
2015	66 000,00
2016	66 000,00
2017	66 000,00
2018	66 000,00
2019	66 000,00
2020	66 000,00
2021	66 000,00
2022	66 000,00
2023	66 000,00
2024	66 000,00
2025	66 000,00

Justification of the choice of data or description of measurement methods	Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated with the aid of the appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used in the process are subject to periodic testing (calibration)
Any comment	-

Data/Parameters	$MSW_{T,3}$
Data unit	t
Description	Amount of spent grains that is to be disposed at landfills without activities under the project at the Mykolaiv branch
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"Waste treatment" (form №1-Waste)
Value of data applied (for ex ante calculations/determinations)	Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated on the basis of the prognosis of production data made by the company

Year	t
2004	31 900,00
2005	37 411,00
2006	49 524,76
2007	56 897,55
2008	53 586,21
2009	46 803,21
2010	47 444,40
2011	49 836,50
2012	47 000,00
2013	47 000,00
2014	47 000,00
2015	47 000,00
2016	47 000,00
2017	47 000,00
2018	47 000,00
2019	47 000,00
2020	47 000,00
2021	47 000,00
2022	47 000,00
2023	47 000,00
2024	47 000,00
2025	47 000,00

Justification of the choice of data or description of measurement methods	Expected amount of production of spent grains to be disposed at landfills without activities under the project is calculated with the aid of the appropriate measuring equipment
QA/QC procedures (to be) applied	Measuring equipment used in the process are subject to periodic testing (calibration)
Any comment	-

Data/Parameters	MCF
Data unit	Arbitrary units (a.u.)
Description	Coefficient of correction of the methane flow
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", table 3.5.2
Value of data applied (for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Year	a.u.
2004	0,720788
2005	0,724200
2006	0,723200
2007	0,724200
2008	0,726200
2009	0,726000
2010	0,726000
2011	0,726000
2012	0,726000
2013	0,726000
2014	0,726000
2015	0,726000
2016	0,726000
2017	0,726000
2018	0,726000
2019	0,726000
2020	0,726000
2021	0,726000
2022	0,726000
2023	0,726000
2024	0,726000
2025	0,726000

Data/Parameters	DOC
Data unit	t C/t
Description	Fraction of degradable organic carbon
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", table 8.2
Value of data applied (for ex ante calculations/determinations)	0,15
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	DOC_f
Data unit	Arbitrary units (a.u.)
Description	Fraction of the degradable organic carbon that decomposes
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", p.295
Value of data applied (for ex ante calculations/determinations)	0,55
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	F
Data unit	Arbitrary units (a.u.)
Description	Fraction of CH_4 in landfill gas
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", p.295
Value of data applied (for ex ante calculations/determinations)	0,5
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	R
Data unit	t CH_4
Description	Fraction of methane utilized at landfills
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", p.295
Value of data applied (for ex ante calculations/determinations)	0
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

Data/Parameters	OX
Data unit	Arbitrary units (a.u.)
Description	Oxidation factor
Time of determination/monitoring	Annually. The data must be preserved during the crediting period plus two years after the last issuance of ERUs
Source of data (to be) used	"NIR of Ukraine", p.296
Value of data applied (for ex ante calculations/determinations)	0
Justification of the choice of data or description of measurement methods	National Inventory Report is subject to periodic reviews and addition of the updated data
QA/QC procedures (to be) applied	-
Any comment	-

- - - - -

У цьому документі прошито, пронумеровано

та скріплено печаткою 110 аркушів

Старший юрисконсульт

ПАТ «САН ІНБЕВ УКРАЇНА» _____ Балахнов О.В.

(підпис)

МП