INITIAL AND FIRST
MONITORING REPORT
OF JOINT IMPLEMENTATION PROJECT

Version 1.0
30 November 2012

CONTENTS

SECTION A. General Project activity information

A.1 Title of the project activity:

Implementation of technological modernization of LLC "TH "Shepetivsky Sugar"

Sectoral scope: (3) Energy demand.
(13) Waste handling and disposal.

A.2. Short description of the project activity:

The project is implemented at LLC "TH "Shepetivsky Sugar" which is located in Khmelnitsk oblast of Ukraine. The project activity includes to parts:

1) Implementation of the energy efficiency measures to reduce consumption of electricity and natural gas;
2) Advancement of the waste utilization practices.

The project is aimed at achieving greenhouse gases emission reductions through decreasing specific natural gas and electricity consumption during sugar production, and advancing waste management practices at LLC "TH "Shepetivsky Sugar". As a result of the project implementation energy consumption of the enterprise is reduced, which is related to greenhouse gases emissions, and the quantity of the beetroot pulp decreases, which would be moved to landfill, where as a resultant of anaerobic fermentation of the organic matter contained in the beetroot pulp methane would be released, which is a greenhouse gas.

Reductions in specific consumption of natural gas and electricity are achieved as a result of replacement of filtering equipment, installation of frequency converters, introduction of new burners for gas-fired boilers, replacement of centrifuges and partial automatisation of the process. Utilization of beetroot pulp became possible due to installation of additional presses for advanced water separation.

Baseline scenario is continuation of current practice: specific consumption of natural gas and electricity would remain at pre-project levels, and beetroot pulp would be stored as it was produced in pulp pits, with no additional efforts undertaken to reduce its water content. When pulp pit would be full, beetroot pulp would be removed to landfill. This scenario envisages decay of the organic matter with release of the landfill gas, which contains greenhouse gas methane.

A.3. Monitoring period:

- Monitoring period starting date: 01.01.2008;
- Monitoring period closing date: 30.11.2012.

A.4. Methodology applied to the project activity:

The monitoring plan was developed in accordance with determined PDD and in accordance with Appendix B to JI guidelines, Guidance on Criteria for Baseline Setting and Monitoring (Version 03). JI specific approach is used. Achieved Monitoring Plan was set during the determination process.

A.4.1. Baseline methodology:

This baseline scenario has been established according to the criteria outlined in the Guidance by JISC:

1) On a project specific basis;
2) In a transparent manner with regard to the choice of approaches, assumptions, methodologies, parameters, data sources and key factors. All parameters and data are either monitored by the project participants or are taken from sources that provide a verifiable reference for each parameter. Project participants use approaches suggested by the Guidance and the methodological Tools approved by the CDM Executive Board;
3) Taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector. The above analysis shows that the chosen baseline is the most plausible future scenario, taking into account the current situation in the sugar industry of Ukraine;
4) In such a way that emission reduction units (ERUs) cannot be earned for decreases in activity levels outside the project activity or due to force majeure. According to the proposed approach emission reductions will be earned only when project activity will generate refined oil products, so no emission reductions can be earned due to any changes outside the project activity;
5) Taking account of uncertainties and using conservative assumptions. A number of steps have been taken in order to account for uncertainties and safeguard conservativeness:
    a. If possible, the same approach to calculating the level of baseline and project emissions as specified in the National inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases in the Ukraine are used. The National emissions inventories use country-specific emission factors that are set to meet the IPCC values;
    b. Lower range of parameters is used for calculation of baseline emissions and higher range of parameters is used for calculation of project activity emissions;
    c. To reduce uncertainty and ensure conservativeness of emission calculations default values were used to the extent possible.

In the baseline scenario the emission sources within the project boundaries are:

- CO_2 emissions due to natural gas combustion;
- CO_2 emissions due to electricity consumption;
- CH_4 emissions due to organic waste decay at landfill (beetroot pulp).

A.4.2. Monitoring methodology:

For this project in accordance with Guidance on Criteria for Baseline Setting and Monitoring, Version 03 the JI specific approach was developed. The final monitoring plan was approved during determination.

Emission reductions due to the project come from three sources:

- CO_2 emissions due to natural gas combustion;
- CO_2 emissions due to electricity consumption;
- CH_4 emissions due to organic waste decay at landfill (beetroot pulp).

The following parameters are monitored:

- sugar production;
- natural gas consumption;
- electricity consumption;
- amount of sugar production organic waste, that was not sold and was transported to the disposal site;
- amount of sugar production organic waste, that would be transported to the disposal site;
- correction factor to account for uncertainties;

- Share of methane being captured and utilized at the disposal site (to determine project and baseline emissions);
- Global warming potential for methane (to determine project and baseline emissions);
- Oxidation factor, which characterizes the fraction of methane oxidizing in the material that covers wastes (to determine project and baseline emissions);
- Volume of methane in the landfill gas (to determine project and baseline emissions);
- Fraction of carbon of organic origin, which can be decomposed (to determine project and baseline emissions);
- Methane conversion factor (to determine project and baseline emissions);
- Weight fraction of organic origin carbon in the beetroot pulp (to determine project and baseline emissions);
- Decomposition factor of wastes (beetroot pulp) (to determine project and baseline emissions).

Sugar production, amount of sugar production organic waste, that was not sold and was transported to the disposal site, and amount of sugar production organic waste, that would be transported to the disposal site are measured using automated weighing complex, which serves for tracking of the cargo, its mass, protection of the results from unauthorized change and computer processing of the data. Measuring devices are the truck scales which are regularly calibrated. Natural gas and electricity consumption is measured by special commercial meters. Other listed parameters are to be set from auxiliary sources.

A.5. Status of implementation including time table for major project parts:

The project was initiated by LLC "TH "Shepetivsky Sugar" in the middle of 2003. It was started with the creation of the Working Group on Technical Modernization and Advancement of Waste Utilization Practices at LLC "TH "Shepetivsky Sugar" in November 2003. The project has already been implemented. Main project activity was being realized during 2005-2011, that leaded to occurrence of emission reductions starting from 2005 and gradually increasing as components of the project activity were being commissioned.

Table 1 below illustrates implementation of different stages of the project.

Table 1. Implementation plan.

<table>
<tr><th>Stage</th><th>Dates</th></tr>
<tr><td>Decision making about the project</td><td>27/06/2003</td></tr>
<tr><td>Investment phase</td><td>06/03/2005-23/07/2011</td></tr>
<tr><td>Construction and fettling works</td><td>01/07/2005-14/08/2011
<table>
<tr><th>#</th><th>Activity</th><th>Implementation year</th></tr>
<tr><td>1.</td><td>Upgrade of second saturation juice postfiltration station</td><td>2005</td></tr>
<tr><td>2.</td><td>Upgrade of station for filtration of suspension of first saturation</td><td>2006</td></tr>
<tr><td>3.</td><td>Upgrade of sulfited syrup filtration station</td><td>2007</td></tr>
<tr><td>4</td><td>Installation of additional presses for deep wringing</td><td>2007</td></tr>
<tr><td>5.</td><td>Installation of frequency converters on pump motors for filtration of juice of first saturation</td><td>2009</td></tr>
<tr><td>6.</td><td>Installation of jet-niche burners on steam boiler #5 TM-25/39</td><td>2009</td></tr>
<tr><td>7.</td><td>Upgrade of station for postfiltration of juice of first saturation</td><td>2010</td></tr>
<tr><td>8.</td><td>Replacement of syrup and molasses pumps</td><td>2010</td></tr>
</table></td></tr>
</table>

	9.	Installation of jet-niche burners on steam boiler #3 TM-25/39	2010
	10.	Installation of jet-niche burners on steam boiler #4 TM-25/39	2010
	11.	Installation of jet-niche burners on steam boiler #6 TM-50/39	2010
	12.	Backward washing scheme after KF-1000 filters for liming in lime section installed	2010
	13.	Automatisation of fillmass of second and third products making process	2010
	14.	Upgrade of centrifugal station for fillmass of first product	2011
Operation phase	01/08/2005-31/12/2029		

The implementation plan above fully corresponds to the determined PDD.

Letters of Approval were issued by both of the Parties and are referred to in PDD.

Letter of Approval of SEIA of Ukraine No. 3664/23/7 was issued on 28/11/2012.
Letter of Approval No. 2012JI56 was issued by NL Agency, Ministry of Foreign Affairs of Netherlands on 28/11/2012.

A.6. Intended deviations or revisions to the determined PDD:

A slight deviations in the amount of carbon credits takes place in 2012. Emission reductions achieved exceed projected in the PDD on 13 260 t CO_2e. This difference is a logical reflection of fact that in the PDD for predicting emission reductions in 2012 used data based on load level assumptions (see PDD, version 3.0), while in this report the actual values from official sources were used.

A.7. Intended deviations or revisions to the determined monitoring plan:

There were no intended deviations or revisions to the determined monitoring plan.

A.8. Changes since last verification:

Not applicable.

A.9. Person(s) responsible for the preparation and submission of the monitoring report:

LLC "TH "Shepetivsky Sugar":

- Bilym Evgen Volodymyrovych, Director.

"Company "MT-Invest" LTD

- Vasylieva Nataliya Vjacheslavivna, Environmental project manager.

SECTION B. Key monitoring activities
(according to the monitoring plan for the monitoring period stated in A.3.)

In the monitoring period indicated in A.3 the data of the following parameters has to be collected and archived:

1. **Sugar production**

The parameter is measured in accordance with internal data collection procedures approved by the plant using automated weighing complex, which serves for tracking of the cargo, its mass, protection of the results from unauthorized change and computer processing of the data. Measuring devices are the truck scales which are regularly calibrated once a year. Monitoring data are filled in the reports of Technical Modernization and Advancement of Waste Utilization Practices at LLC "TH "Shepetivsky Sugar", that will be used for preparation of monitoring reports.

2. **Natural gas consumption**

Natural gas consumption is measured by special commercial meters, which are regularly calibrated once in 2 years. Monitoring data are filled in the reports of Technical Modernization and Advancement of Waste Utilization Practices at LLC "TH "Shepetivsky Sugar", that will be used for preparation of monitoring reports.

3. **Electricity consumption**

Electricity consumption is measured by special commercial meters, which are regularly calibrated once in 6 years. Monitoring data are filled in the reports of Technical Modernization and Advancement of Waste Utilization Practices at LLC "TH "Shepetivsky Sugar", that will be used for preparation of monitoring reports.

4. **Amount of sugar production organic waste, that was not sold and was transported to the disposal site**

The parameter is measured in accordance with internal data collection procedures approved by the plant using automated weighing complex, which serves for tracking of the cargo, its mass, protection of the results from unauthorized change and computer processing of the data. Measuring devices are the truck scales which are regularly calibrated once a year. Monitoring data are filled in the reports of Technical Modernization and Advancement of Waste Utilization Practices at LLC "TH "Shepetivsky Sugar", that will be used for preparation of monitoring reports.

5. **Amount of sugar production organic waste, that would be transported to the disposal site**

Similarly to previous one, the parameter is measured in accordance with internal data collection procedures approved by the plant using automated weighing complex, which serves for tracking of the cargo, its mass, protection of the results from unauthorized change and computer processing of the data. Measuring devices are the truck scales which are regularly calibrated once a year. Monitoring data are filled in the reports of Technical Modernization and Advancement of Waste Utilization Practices at LLC "TH "Shepetivsky Sugar", that will be used for preparation of monitoring reports.

6. **Correction factor to account for uncertainties**

The value for this parameter is based on Study on validation of landfill gas formation models.[1]

7. **Share of methane being captured and utilized at the disposal site (to determine project and baseline emissions)**

Value of this parameter was taken equal to zero since in accordance with the project owner's information regarding the landfill used, no methane capturing activities hs been undertaken there.

8. **Global warming potential for methane (to determine project and baseline emissions)**

[1] Oonk H., Weenk A., Coops O., Luning L. (1994) Validation of landfill gas formation models; EWAB 9427; NOVEM, Utrecht, The Netherlands.

Value of this parameter was taken in accordance with UNFCCC decision and Kyoto Protocol.

9. **Oxidation factor, which characterizes the fraction of methane oxidizing in the material that covers wastes (to determine project and baseline emissions)**

Data are sourced from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, which is a reliable internationally recognized data source for greenhouse gases emissions calculation.

10. **Volume of methane in the landfill gas (to determine project and baseline emissions)**

Data are sourced from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, which is a reliable internationally recognized data source for greenhouse gases emissions calculation.

11. **Fraction of carbon of organic origin, which can be decomposed (to determine project and baseline emissions)**

Data are sourced from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, which is a reliable internationally recognized data source for greenhouse gases emissions calculation.

12. **Methane conversion factor (to determine project and baseline emissions)**

Data are sourced from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, which is a reliable internationally recognized data source for greenhouse gases emissions calculation.

13. **Weight fraction of organic origin carbon in the beetroot pulp (to determine project and baseline emissions)**

Value of this parameter was measured by the project owner through laboratory testing. The results received where in the range provided by 2006 IPCC.

14. **Decomposition factor of wastes (beetroot pulp) (to determine project and baseline emissions)**

Data are sourced from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, which is a reliable internationally recognized data source for greenhouse gases emissions calculation.

B.1. Monitoring equipment

1. Truck scales «RP25T» (2 units);
2. Truck scales «AC-30T» (2 units);
3. Gas meter RGK-Ex (1 unit);
4. Electricity meter CA4E-5030 60A (1 unit).

B.1.2. Table providing information on the equipment used (incl. producer, type, serial number, uncertainty level, required calibration intervals):

Table 2: Monitoring equipment (scales)

ID	Parameter	Measuring device	Units.	Producer	Serial number	Uncertainty level	Calibration interval
W1	Sugar production; Amount of sugar production organic waste, that was not sold and was transported to the disposal site; Amount of sugar production organic waste, that would be transported to the disposal site.	Truck beam scales RP25T	t	LLC «Chemical Equipment Plant», Armavir	1567	1	12 month
W2		Truck beam scales RP25T	t	LLC «Chemical Equipment Plant», Armavir	1059	1	12 month
W3		Truck dial scales AC-30T	t	LLC «Chemical Equipment Plant», Armavir	6526	2	12 month
W4		Truck dial scales AC-30T	t	LLC «Chemical Equipment Plant», Armavir	3536	2	12 month

Data are automatically transferred to automated weighing complex 25080879.00001.001 PS, which records and stores the data. Before each measuring type of the cargo is registered, the computer system than sorts the data by parameter.

Calibration of the measuring devises and equipment was performed regularly in accordance with technical regulations of the Host Party.

Calibration of truck scales RP25T # 1567 during the monitoring period:

- 17/09/2008. – Calibration confirmed that readings of the device are accurate;
- 16/09/2009 - Calibration confirmed that readings of the device are accurate;
- 01/09/2010 - Calibration confirmed that readings of the device are accurate;
- 20/08/2011 - Calibration confirmed that readings of the device are accurate;
- 18/08/2012 - Calibration confirmed that readings of the device are accurate.

Calibration of truck scales RP25T # 1059 during the monitoring period:

- 17/09/2008. – Calibration confirmed that readings of the device are accurate;
- 16/09/2009 - Calibration confirmed that readings of the device are accurate;
- 02/09/2010 - Calibration confirmed that readings of the device are accurate;
- 20/08/2011 - Calibration confirmed that readings of the device are accurate;
- 19/08/2012 - Calibration confirmed that readings of the device are accurate.

Calibration of truck scales AC-30T # 6526 during the monitoring period:

- 17/09/2008. – Calibration confirmed that readings of the device are accurate;
- 16/09/2009 - Calibration confirmed that readings of the device are accurate;
- 01/09/2010 - Calibration confirmed that readings of the device are accurate;

- 20/08/2011 - Calibration confirmed that readings of the device are accurate;
- 20/08/2012 - Calibration confirmed that readings of the device are accurate.

Calibration of truck scales AC-30T # 3536 during the monitoring period:

- 17/09/2008. – Calibration confirmed that readings of the device are accurate;
- 16/09/2009 - Calibration confirmed that readings of the device are accurate;
- 02/09/2010 - Calibration confirmed that readings of the device are accurate;
- 20/08/2011 - Calibration confirmed that readings of the device are accurate;
- 20/08/2012 - Calibration confirmed that readings of the device are accurate.

Calibration of weighing complex 25080879.00001.001 PS during the monitoring period:

- 09/09/2008. – Calibration confirmed that readings of the device are accurate;
- 16/09/2009 - Calibration confirmed that readings of the device are accurate;
- 01/09/2010 - Calibration confirmed that readings of the device are accurate;
- 20/09/2011 - Calibration confirmed that readings of the device are accurate;
- 20/09/2012 - Calibration confirmed that readings of the device are accurate.

Table 3: Monitoring equipment (flow meters)

ID	Parameter	Measuring device	Units.	Producer	Serial number	Uncertainty level	Calibration interval
NG	Natural gas consumption	RGK-Ex	m^3	OSC "Ivano-Frankivsk Plant "Promprylad"	0055	0.5	3 years

Calibration of natural gas flow meter RGK-Ex #0055 during the monitoring period:

- 09/07/2009 – Calibration confirmed that readings of the device are accurate;
- 08/07/2012 – Calibration confirmed that readings of the device are accurate.

Table 4: Monitoring equipment (electricity meters)

ID	Parameter	Measuring device	Units.	Producer	Serial number	Uncertainty level	Calibration interval
EL	Electricity consumption	CA4E-5030 60A	kWh	CSC "Kompaniya Rostok"	03099488	1	10 years

Calibration of electricity meter CA4E-5030 60A #03099488 during the monitoring period:

- 16/06/2006 - Initial calibration confirmed that readings of the device are accurate. Next calibration date is not relevant for current monitoring period.

B.1.3. Calibration procedures

Calibration procedures for the monitoring equipment are in the tables below

Table 5: Calibration procedures for scales

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of truck scales involved in the project is 1 year. Regular cross-check with clients.	Calibration is performed by authorised representatives of State Metrological Service of Ukraine[10]

Table 6: Calibration procedures for natural gas flow meters

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of truck scales involved in the project is 2 years. Regular cross-check with suppliers.	Calibration is performed by authorised representatives of State Metrological Service of Ukraine

Table 7: Calibration procedures for electricity meters

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of truck scales involved in the project is 6 years. Regular cross-check with supplier.	Calibration is performed by authorised representatives of State Metrological Service of Ukraine

B.1.4. Involvement of Third Parties:

State Enterprise "Khmelnitsky Scientific-Production Centre of Standardization, Metrology and Certification" – calibration of the monitoring equipment.

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

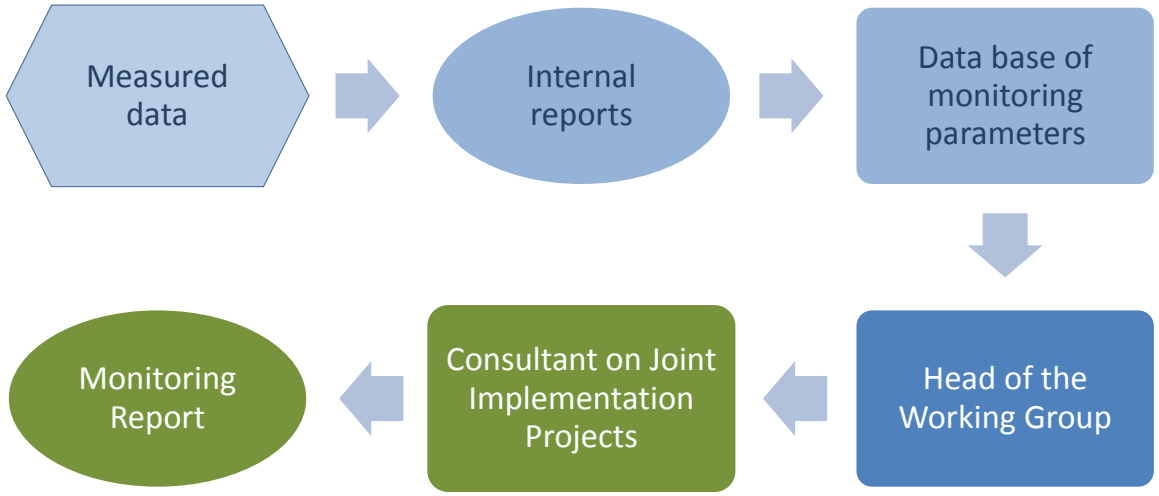

Figure 1: Monitoring data collection scheme.

B.2.1. List of fixed default values and ex-ante baseline factors:

The list of fixed default values is provided below.

Table 8: Fixed values

Data/Parameter	*Units*	*Description*	*Data source*	*Value*	*Uncertainty level*
$SEC_{NG,BL}$	th. m^3/t sugar	Specific baseline consumption of natural gas	Determined PDD . Project owner's data.	0.89	Low
$SEC_{EE,BL}$	th. kWh/ t sugar	Specific baseline consumption of electricity	Determined PDD . Project owner's data.	0.66	Low

B.2.2. List of variables:

Monitoring variables in the project:

Table 9: Project variables.

ID (as in PDD)	*Parameter*	*Calculation method (Measured/ Calculated/ Estimated)*	*Units*	*Comment*	*Measuring device (as in B.1.2)*	*Data aggregation frequency*
D.1.1.1.-P-1	$FC_{NG,PJ,y}$ project natural gas consumption	(M) Measured by special natural gas flow meter	th.m^3	Data will be archived and stored during two years after the last ERU transfer	NG	Data are aggregated monthly, annual reports are prepared
D.1.1.1.-P-2	NCV_{NG} net calorific value of natural gas	(C) Official statistics data	GJ/th.m^3	Data of National Inventory Report for 1990-2010[2] (value for food industry)	-	Reports are prepared annually.
D.1.1.1.-P-3	$EC_{PJ,y}$ Project electricity consumption	(M) Measured by special electricity meter	MWh	Data will be archived and stored during two years after the last ERU transfer	EL	Data are aggregated monthly, annual reports are prepared

[2] http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/ukr-2012-nir-13apr.zip

D.1.1.1.-P-4	$EF_{grid,y}$ carbon dioxide emission factor due to consumption of electricity	(C) Official statistics data	$kgCO_2$/ kWh	Emission factor adopted by Ukrainian DFP for obligatory use in joint implementation projects[3]	-	DFP Orders are adopted annually
D.1.1.1.-P-5	P_x Amount of sugar production organic waste, that was not sold and was transported to the disposal site	(M) Measured with truck scales. Each truck loaded with beetroot pulp is weighted.	t	Data will be archived and stored during two years after the last ERU transfer	W1-W4	Data are aggregated monthly, annual reports are prepared.
D.1.1.1.-P-6	φ correction factor to account for uncertainties	(C) Study on validation of landfill gas formation models[4]	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon introduction of methane capturing activities
D.1.1.1.-P-7	f share of methane being captured and utilized at the disposal site	(C) The data from project owner regarding the landfill used	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon introduction of methane capturing activities
D.1.1.1.-P-8	GWP_{CH4} global warming potential for methane	(C) In accordance with UNFCCC Decision and Kyoto Protocol	tCO_2e/ tCH_4	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of UNFCCC Decision and Kyoto Protocol
D.1.1.1.-P-9	OX oxidation factor, which characterizes the fraction of methane oxidizing in the material that covers wastes	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.15[5]	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas Inventories
D.1.1.1.-P-10	F volume of methane in the landfill gas	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.15[6]	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas Inventories
D.1.1.1.-P-11	DOC_f fraction of carbon of organic origin, which can be decomposed	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.13 [7])	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas

[3] http://www.neia.gov.ua/nature/control/uk/publish/category?cat_id=111922

[4] Oonk H., Weenk A., Coops O., Luning L. (1994) Validation of landfill gas formation models; EWAB 9427; NOVEM, Utrecht, The Netherlands

[5] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf

[6] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf

[7] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_2_Ch2_Waste_Data.pdf

						Inventories
D.1.1.1.-P-12	*MCF* methane conversion factor	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.14[8]	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas Inventories
D.1.1.1.-P-13	*DOC* Weight fraction of organic origin carbon in the beetroot pulp	(C) Laboratory testing data. Results are in the range provided by 2006 IPCC Volume 5: Waste, Chapter 2, Page 2.14[9]	t C/ t beetroot pulp	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Determined based on sampling of pulp
D.1.1.1.-P-14	*k* Decomposition factor of wastes (beetroot pulp)	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.17[10]	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Table 10: Baseline variables

ID (as in PDD)	***Parameter***	***Calculation method (Measured/ Calculated/ Estimated)***	***Units***	***Comment***	***Measuring device (as in B.1.2)***	***Data aggregation frequency***
D.1.1.3.-B-1	$P_{sugar,PJ,y}$ Sugar production	(M) Measured with truck scales. Each truck loaded with sugar is weighted.	t	Data will be archived and stored during two years after the last ERU transfer	W1-W4	Data are aggregated monthly, annual reports are prepared
D.1.1.3.-B-2	NCV_{NG} net calorific value of natural gas	(C) Official statistics data	GJ/th.m^3	Data of National Inventory Report for 1990-2010[11] (value for food industry)	-	Reports are prepared annually.
D.1.1.3.-B-3	$EF_{grid,y}$ carbon dioxide emission factor due to consumption of electricity	(C) Official statistics data	kgCO_2/ kWh	Emission factor adopted by Ukrainian DFP for obligatory use in joint implementation projects[12]	-	DFP Orders are adopted annually

[8] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf
[9] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf
[10] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf

[11] http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/ukr-2012-nir-13apr.zip
[12] http://www.neia.gov.ua/nature/control/uk/publish/category?cat_id=111922

D.1.1.3.-B-4	W_x Amount of sugar production organic waste, that would be transported to the disposal site.	(M) Measured with truck scales. Each truck loaded with beetroot pulp is weighted.	t	Data will be archived and stored during two years after the last ERU transfer	W1-W4	Data are aggregated monthly, annual reports are prepared
D.1.1.3.-B-5	φ correction factor to account for uncertainties	(C) Study on validation of landfill gas formation models13	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon introduction of methane capturing activities
D.1.1.3.-B-6	f share of methane being captured and utilized at the disposal site	(C) The data from project owner regarding the landfill used	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon introduction of methane capturing activities
D.1.1.3.-B-7	GWP_{CH4} global warming potential for methane	(C) In accordance with UNFCCC Decision and Kyoto Protocol	tCO2e/ tCH4	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of UNFCCC Decision and Kyoto Protocol
D.1.1.3.-B-8	OX oxidation factor, which characterizes the fraction of methane oxidizing in the material that covers wastes	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.1514	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas Inventories
D.1.1.3.-B-9	F volume of methane in the landfill gas	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.1515	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas Inventories
D.1.1.3.-B-10	DOC_f fraction of carbon of organic origin, which can be decomposed	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.13 16)	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas Inventories
D.1.1.3.-B-11	MCF methane conversion factor	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.1417	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas Inventories

[13] Oonk H., Weenk A., Coops O., Luning L. (1994) Validation of landfill gas formation models; EWAB 9427; NOVEM, Utrecht, The Netherlands

[14] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf

[15] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf

[16] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_2_Ch2_Waste_Data.pdf

[17] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf

D.1.1.3.-B-12	*DOC* Weight fraction of organic origin carbon in the beetroot pulp	(C) Laboratory testing data. Results are in the range provided by 2006 IPCC Volume 5: Waste, Chapter 2, Page 2.1418	t C/ t beetroot pulp	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Determined based on sampling of pulp
D.1.1.3.-B-13	*k* Decomposition factor of wastes (beetroot pulp)	(C) 2006 IPCC Volume 5: Waste, Chapter 3, Page 3.1719	fraction	The data will be archived and kept for two years after the last transfer of ERUs from the project.	-	Upon updates of 2006 IPCC Guidelines for National Greenhouse Gas Inventories

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

Table 11: Data collected for project emissions calculations

Variable	Description	Unit	Value				
			2008	**2009**	**2010**	**2011**	**2012 (11 months)**
$FC_{NG,PJ,y}$	Project natural gas consumption	th.m^3	8651	6383	9692	7452	8832
NCV_{NG}	Net calorific value of natural gas	GJ/th.m^3	33.8	33.8	33.8	33.8	33.8
$EC_{PJ,y}$	Project electricity consumption	MWh	7324	4906	8189	6701	8270
$EF_{grid,y}$	Carbon dioxide emission factor due to consumption of electricity	kgCO_2/ kWh	1.219	1.237	1.225	1.227	1.227
P_x	Amount of sugar production organic waste, that was not sold and was transported to the disposal site	t	0	0	0	0	0

[18] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf
[19] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf

Table 12: Data collected for project emissions calculations (continue)

Variable	***Description***	***Units***	***Values 2008-2012***
φ	Correction factor to account for uncertainties	tCO_2e/tCH_4	0.9
GWP_{CH4}	Global warming potential for methane	fraction	21
f	Share of methane being captured and utilized at the disposal site	fraction	0
OX	Oxidation factor, which characterizes the fraction of methane oxidizing in the material that covers wastes	fraction	0
F	Volume of methane in the landfill gas	fraction	0.5
DOC_f	Fraction of carbon of organic origin, which can be decomposed	fraction	0.5
MCF	Methane conversion factor	tC/ t beetroot pulp	0.8
DOC	Weight fraction of organic origin carbon in the beetroot pulp	fraction	0.5
k	Decomposition factor of wastes (beetroot pulp)	tCO_2e/tCH_4	0.185

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

Table 13: Data collected for baseline emissions calculations

Variable	**Description**	**Unit**	**Value**				
			2008	**2009**	**2010**	**2011**	**2012 (11 months)**
$P_{sugar,PJ,y}$	Sugar production	t	25008	20727	26943	25690	27033
NCV_{NG}	Net calorific value of natural gas	$GJ/th.m^3$	33.8	33.8	33.8	33.8	33.8
$EF_{grid,y}$	Carbon dioxide emission factor due to consumption of electricity	$kgCO_2$/ kWh	1.219	1.237	1.225	1.227	1.227
W_x	Amount of sugar production organic waste, that would be transported to the disposal site.	t	144655	98791	143039	118556	150845

Table 14: Data collected for baseline emissions calculations (continue)

Variable	***Description***	***Units***	***Values 2008-2012***
φ	Correction factor to account for uncertainties	tCO_2e/tCH_4	0.9
GWP_{CH4}	Global warming potential for methane	fraction	21
f	Share of methane being captured and utilized at the disposal site	fraction	0
OX	Oxidation factor, which characterizes the fraction of methane oxidizing in the material that covers wastes	fraction	0
F	Volume of methane in the landfill gas	fraction	0.5
DOC_f	Fraction of carbon of organic origin, which can be decomposed	fraction	0.5
MCF	Methane conversion factor	tC/ t beetroot pulp	0.8
DOC	Weight fraction of organic origin carbon in the beetroot pulp	fraction	0.5
k	Decomposition factor of wastes (beetroot pulp)	tCO_2e/tCH_4	0.185

B.2.5.Data concerning leakage:

PDD did not identify any leakages, therefore, this section is not applicable.

B.2.6.Data concerning environmental impacts:

According to the legislation of Ukraine, a detailed EIA for this project is not needed.

In general, environmental impact of the project activity is positive. Reduction of natural gas consumption leads to decrease in emissions of its combustion products to the atmosphere. Lowering electricity consumption reduces negative effects of its production.

Implementation of the project activity also has a positive social impact through removing of the concentrated odor beetroot pulp storage facilities and improving working conditions at the sugar plant. Since in the area of the project implementation the use of well water is widespread, the reduction of groundwater pollution has positive effects on health of locals.

Since the project does not lead to negative impacts on the environment, transboundary impacts that occur in any other country, and are caused by implementation of this project, which is physically located entirely within Ukraine, are absent.

B.3.Data processing and archiving:

All data will be stored in electronic and paper forms. Data collection procedures for each of the monitoring parameters are standard and are performed as a part of general commercial activity of the plant.

B.4. Special event log:

All special and outstanding events (critical failures of equipment, reconstructions, emergencies) are documented by filling in a special log by management of the project owner. There are no special events recorded for the monitoring period.

The nature of the project and implemented activities does not to occurrence of any factors, which can lead to unplanned emissions due to emergency.

SECTION C. Quality assurance and quality control measures

C.1. Documented procedures and management plan:

C.1.1. Roles and responsibilities:

The Head of the Working Group on Technical Modernization and Advancement of Waste Utilization Practices at LLC "TH "Shepetivsky Sugar" – Director of LLC "TH "Shepetivsky Sugar" - is responsible for performance of monitoring data collection, recording, visualization and archiving, as well as periodic inspection of measuring instruments. This person will be responsible filling in the data base of project monitoring parameters based on readings of the measuring equipment. On the basis of this consolidated database and primary documents (internal reports on Technical Modernization and Advancement of Waste Utilization Practices at LLC "TH "Shepetivsky Sugar") JI project consultant prepares Monitoring Reports. The block diagram demonstrates principal scheme of data flow (see figure 1 above).

C.1.2. Trainings:

The project does not require intensive staff training. The required amount of employees can obtain a basic technical training at the project site. Most of the necessary workers such as engineers, agricultural technicians, machine operators, power engineers and mechanics, truck drivers are locally available. Local resources meet project maintenance needs: own and hired workers and repair contractors. Project foresees the need for training. All employees must have a valid certificate of vocational education, and periodically pass safety training and exams. Professional training in all required areas of professional project is available in the educational institution of Ukraine.

Health and safety training is obligatory and must be organized for entire personnel of the project in accordance with the local legislation. Training procedure on H&S includes training program, intervals, forms and knowledge examination. Management of the plant, where the project was implemented ensures registration of the trainings and periodic knowledge screenings.

Activities, directly related to monitoring, does not require special knowledge except those that are provided in course of general professional education. Thus, personnel which is responsible for monitoring, is getting necessary training regarding monitoring procedures and requirements, and also gets training and consultations on Kyoto Protocol, JI projects and monitoring from the project consultant - "Company "MT-Invest" LTD.

C.2. Involvement of Third Parties:

State Enterprise "Khmelnitsky Scientific-Production Centre of Standardization, Metrology and Certification" – calibration of the monitoring equipment.

C.3. Internal audits and control measures:

For all the monitoring data internal cross-checks and audit is performed, since primary documents used for monitoring are also are involved in commercial activity of the plant. Director of the company checks monthly and annual reports using primary documents.

In order to ensure quality of the fixed parameters and fixed ex ante parameters and factors it is necessary to check that data were sourced from reliable (recognized and/or study results) and verifiable (opensource available for the project participants) sources.

C.4. Troubleshooting procedures:

All outstanding and related to break ups events are documented in the internal records. Because the data monitored in order to calculate emission reductions are also used in the commercial activity of the plant and

are relevant to sugar production, in cases of operation time-outs, emission reductions are not taken into account.

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

SECTION D. Calculation of GHG emission reductions

D.1. Table with the formulae which were used:

Table 15: Equations used for calculations.

Equation No. as in PDD	***Equation***	***Description***
Equation 12	$ER_y = BE_y - LE_y - PE_y$	Emissions reductions in the period y
Equation 5	$BE_y = BE_{NG,y} + BE_{EE,y} + BE_{CH_4,y}$	Baseline emissions in the period *y*
Equation 6	$BE_{NG,y} = \frac{FC_{NG,BL,y} \times NCV_{NG,y} \times EF_{NG}}{10^6}$	Baseline CO_2 emissions due to natural gas combustion in the period *y*
Equation 7	$FC_{NG,BL,y} = SEC_{NG,BL} \times P_{sugar,PJ,y}$	Baseline natural gas consumption in the period *y*
Equation 8	$BE_{EE,y} = EC_{BL,y} \times EF_{grid,y}$	Baseline CO_2 emissions due to electricity consumption in the period *y*
Equation 9	$EC_{BL,y} = SEC_{EE,BL} \times P_{sugar,PJ,y}$	Baseline electricity consumption in the period *y*
Equation 10	$BE_{CH4,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot {}^{16}/_{12} \cdot F \cdot DOC_f \cdot MCF \cdot \cdot \sum_{x=1}^{y} W_x \cdot DOC \cdot e^{-k\cdot(y-x)} \cdot \left(1-e^{-k}\right)$	Baseline methane emissions due to organic waste decay at landfill for the period from the beginning of the project till the end of the period y
Equation 11	$LE_y = 0$	Leakages in the period *y* (equal to 0 in accordance with the chosen methodology)
Equation 1	$PE_y = PE_{NG,y} + PE_{EE,y} + PE_{CH_4,y}$	Project emissions in the period *y*
Equation 2	$PE_{NG,y} = \frac{FC_{NG,PJ,y} \times NCV_{NG,y} \times EF_{NG}}{10^6}$	Project CO_2 emissions due to natural gas combustion in the period *y*
Equation 3	$PE_{EE,y} = EC_{PJ,y} \times EF_{grid,y}$	Project CO_2 emissions due to electricity consumption in the period *y*
Equation 4	$PE_{CH4,y} = \varphi \cdot (1-f) \cdot GWP_{CH4} \cdot (1-OX) \cdot {}^{16}/_{12} \cdot F \cdot DOC_f \cdot MCF \cdot \cdot \sum_{x=1}^{y} P_x \cdot DOC \cdot e^{-k\cdot(y-x)} \cdot \left(1-e^{-k}\right)$	Project methane emissions due to organic waste decay at landfill for the period from the beginning of the project till the end of the period y

Parameters of the equations are named in parts B.2.1 and B.2.2 of this report.

Factor 16/12 in the equations above is a molecular weight ration of methane (16) to molecular weight of carbon (12) and reflects transformation (recovery) of carbon to methane. Factor 10^6 – is a conversion dimensionless factor necessary to keep the units correct in the formulae.

Results of the emissions calculations are presented in metric tons of carbon dioxide equivalent (tCO_2e), 1 metric ton of carbon dioxide equivalent is equal to 1 metric ton of carbon dioxide (tCO_2), i.e. 1 tCO_2e = 1 tCO_2.

D.2. Description and justification of uncertainties:

All uncertainties of measuring of the monitoring parameters are determined in accordance with requirements of equipment producers. Uncertainty level for fixed values and external data is low, since they are taken from trustful, available and verified sources.

D.3. GHG emission reductions (see part B.2. of this document):

D.3.1. Project emissions:

Table 16: Project emissions in the monitoring period.

Parameter	Units	2008	2009	2010	2011	2012 (11 months)	Total
Project emissions	tCO_2e	25 332	18 172	28 410	22 352	26 894	**182 990**

D.3.2. Baseline emissions:

Table 17: Baseline emissions in the monitoring period.

Parameter	Units	2008	2009	2010	2011	2012 (11 months)	Total
Baseline emissions	tCO_2e	259 384	257 725	299 277	307 483	333 991	**1 750 823**

D.3.3. Leakage:

Table 18: Leakages in the monitoring period.

Parameter	Units	2008	2009	2010	2011	2012 (11 months)	Total
Leakages	tCO_2e	0	0	0	0	0	**0**

D.3.4. Summary of the emissions reductions during the monitoring period:

Table 19: Emission reductions in the monitoring period.

Parameter	Units	2008	2009	2010	2011	2012 (11 months)	Total
Emission reductions	tCO_2e	234 052	239 553	270 867	285 131	307 097	**1 336 700**

Annex 1

Definitions and acronyms

Acronyms and Abbreviations

CH_4	METHANE
CO_2	CARBON DIOXIDE
GHG	GREENHOUSE GASES
GWP	GLOBAL WARMING POTENTIAL
IPCC	INTERGOVERMENTAL PANEL ON CLIMATE CHANGE
PDD	PROJECT DESIGN DOCUMENT
COG	COKE OVEN GAS
BF	BLAST FURNACE
APSC	AUTOMATIC PROCESS CONTROL SYSTEM
OHFS	OPEN HEARTH FURNACES

Definitions

Baseline	The scenario that reasonably represents what would have happened to greenhouse gases in the absence of the proposed project, and covers emissions from all gases, sectors and source categories listed in Annex A of the Protocol and anthropogenic Removals by sinks, within the project boundary.
Emissions reductions	Emissions reductions generated by a JI project that have not undergone a verification or determination process as specified under the JI guidelines, but are contracted for purchase.
Global Warming Potential (GWP)	An index that compares the ability of greenhouse gases to absorb heat in the atmosphere in comparison to carbon dioxide. The index was established by the Intergovernmental Panel of Climate Change.
Greenhouse gas (GHG)	A gas that contributes to climate change. The greenhouse gases included in the Kyoto Protocol are: carbon dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorcarbons (HFCs), Perfluorcarbons (PFCs) and Sulphurhexafluoride (SF6).
Joint Implementation (JI)	Mechanism established under Article 6 of the Kyoto Protocol. JI provides Annex I countries or their companies the ability to jointly implement greenhouse gas emissions reduction or sequestration projects that generate Emissions Reduction Units.
Monitoring plan	Plan describing how monitoring of emission reductions will be undertaken. The monitoring plan forms a part of the Project Design Document (PDD).