INITIAL AND FIRST PERIODIC ANNUAL JI MONITORING REPORT

Version 3.2

16th of March 2012

CONTENTS

SECTION A. General project activity and monitoring information

A.1 Title of the project activity:

Introduction of a 12.5 MWe CHP with a coke plant's flue gases utilization at the branch of ISTEK LLC "Horlivka Coke Plant".

Sectoral scope: 1. Energy industries (renewable/non-renewable sources)

4. Manufacturing industries

A.2. JI registration number:

Reference number: 0187
ITL project ID: UA2000018

A.3. Short description of the project activity:

This Project is aimed to produce carbon neutral electricity through waste gas utilization and GHG emission reduction of the branch of ISTEK LLC Horlivka Coke Plant (HCP), located in Horlivka, Ukraine. Waste gas that is utilized by the project is coke oven gas (COG), which is a by-product of the coke production at the plant. Utilization of the COG in the combined heat and power plant of the HCP will generate carbon neutral electricity, as in the absence of the project the entire COG would be burnt without electricity generation.

The proposed JI Project consists of installation of steam boiler and steam turbo generator with all necessary auxiliary equipment. The steam boiler generates 85 tonnes of steam per hour with pressure 3.82 MPa and temperature 440°C. The steam turbo generator has a nominal installed capacity of 12.5 MWe. The CHP is fuelled by COG available for energy production. Significant part of energy generated by the CHP is sold to the unified energy system of Ukraine (hereinafter – grid) ; and the other part is used for CHP operation.

In the baseline scenario the significant part of COG was combusted on special flare and some of COG was used in old boiler house which has been switched to stand-by mode at the moment. Old boiler is used during maintenance of the CHP.

A.4. Monitoring period:

- Monitoring period starting date: 01/04/2011
- Monitoring period closing date: 31/12/2011

Both starting and closing date are included in monitoring period.

A.5. Methodology applied to the project activity (incl. version number):

Approved consolidated baseline and monitoring methodology ACM0012 (version 03.1) "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (hereinafter – ACM0012) is used.

A.5.1. Baseline methodology:

According to the chosen methodology, continuation of existing situation has been identified as the most plausible baseline scenario among all realistic and credible alternatives.

The baseline emissions would occur in the absence of the project from electricity production, which would have been generated by fossil fuel power plants in the Ukrainian power grid.

The baseline emissions will be calculated based on the following inputs:

- All electricity generated by the project from the COG is carbon neutral;
- Electricity generated by the project from the COG and consumed by CHP's auxiliaries is considered as project emissions.

A.5.2. Monitoring methodology:

Approved consolidated baseline and monitoring methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 03.1) is applied.

According to ACM0012, project emissions include emissions due to combustion of auxiliary fuel to supplement waste gas and electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of heat/energy/electricity.

In case of the proposed project there is no auxiliary fuel to supplement COG due to the CHP design.

The following conservative approach is used to monitor project scenario emissions.

Additional electricity is consumed by the new equipment installed within the limits of the proposed CHP during operation (e.g. pumps, fans, control system, etc.). This electricity is carbon neutral, because CHP is fuelled by COG, which was flared and burnt in old boiler house before project implementation. However, auxiliary electricity consumption would not occur in the absence of the proposed project, so it needs to be considered as a projects emissions source. Also, some electricity was imported from the grid during maintenance of the CHP.

The following parameters are included into the monitoring plan:

- Electricity consumed from the grid during maintenance of CHP in year y;
- Amount of electricity supplied to the grid which in the absence of project would have been generated by fossil fuelled power plants;
- Amount of COG generated by HCP in the relevant period;
- CO_2 emission factor for 2nd voltage class grid connected power consumption in year *y* for JI project consuming electricity;
- CO_2 emission factor for emissions from thermal power plants energy production connected to unified energy system of Ukraine.

A.6. Status of implementation including time table for major project parts:

Project CHP start-up has been originally planned for the date of 25/09/2007. The actual date of the start-up of the CHP has been the 05/04/2011.

The reasons for delays in the project implementation are listed below:

- Financing issues caused by the financial crisis in 2007-2008.
- Production drop and low demand for the main products.
- Equipment supply difficulties due to financing obstacles.

The CHP commissioning process has been initiated in the March of 2011. The final commissioning test and trials have been performed during the 4-day period between the 1st and 4th of April 2011. These final tests included the 72 hour performance test of the turbine generator with the load ranging between 0 and 8500 kW. Following the results of these tests the CHP has been commissioned and put into the operation on the 5th of April 2011. The supporting documents with corresponding dates are available upon request.

The Table 1 below shows the dates of major steps of project implementation.

Activity	*Date in the PDD*	*Actual Date*
Commissioning	-	20/03/2011 -30/03/2011
Final commissioning tests and trials	-	01/04/2011 – 04/04/2011
Start-up of the CHP	25/09/2007	05/04/2011

Table 1: Implementation plan.

A Letter of Endorsement #4913/11/10-08 for the project was issued on the 15th of April 2008.

Letters of Approval were issued by both Parties involved mentioned in the PDD:

- Letter of Approval from the National Environmental Investments Agency (NEIA) of Ukraine #42/23/7 was obtained on the 20th of January 2010.
- Letter of Approval from the Netherlands Ref.: 2009JI11 was obtained on the 8th of October 2009.

A.7. Intended deviations or revisions to the registered PDD:

There are several deviations from the registered PDD:

1) As the current MR has been prepared for the monitoring period of 9 months, for calculations of baseline equivalent of amount of COG generated in the year y ($Q_{COG,BL,y}$) following formula was used:

$$Q_{COG,BL,y} = \frac{Q_{COG,BL}}{12} \times 9$$

$Q_{COG,BL}$ - amount of COG generated by HCP a year.

2) The HCP does not consume the electricity generated by its own CHP contrary to what has been planned in the PDD. All energy for HCP operations is imported from the grid. The reason for such setup is the design of the electrical lines and substations at the plant. In order to consume electricity directly from the CHP additional investments were required and the associated benefit is not significant and is more organizational than financial or technical. There is also no incentive for the HCP to use energy from the grid instead of CHP energy as the electricity tariffs for grid electricity are higher or on the same level with the tariffs for electricity sales and in any case higher than the production costs of the CHP electricity.

3) The expected emission reductions (ER) mentioned in the project design document (PDD) differ from actual amount of emission reductions, as follows in the table below. This discrepancy can be explained by:

   - higher than expected value of emission factor for reducing projects (details in Section A.8);
   - lower than expected value of the project emissions, because of zero project emission factor value for $EL\_CHP_{y,i}$ (details in section A.8) and lower than expected value of $EL_{PEgrid,y}$ (see Table 2 below).

Values:	***Data in the PDD for respective period of 2011***	***Data in this report***	***Unit***
BE	(70 377/12)×9 = 52 783	47 118	tCO_2
$EL_{PEgrid,y}$	(1 520/12)×9 = 1 140	347	MWh
PE	(12 114/12)×9 = 9 086	425	tCO_2
ER	(58 263/12)×9 = 43 697	46 693	tCO_2

Table 2. Comparing of real and expected values of project parameter.

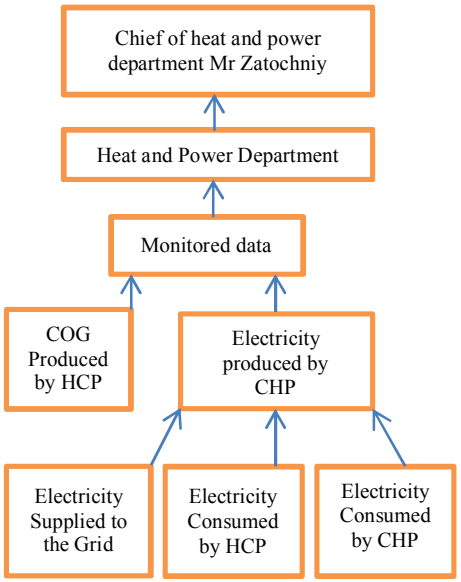
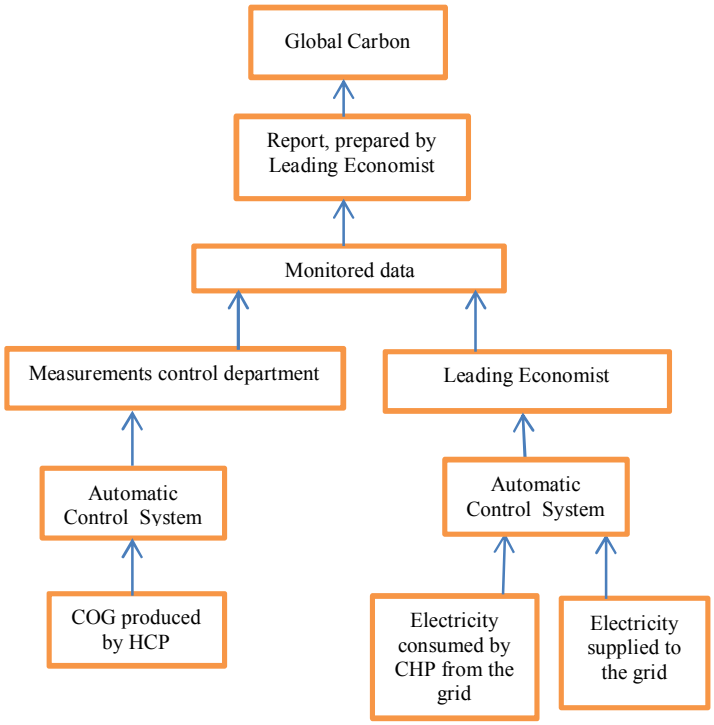
The overall difference in the number of ER is only 2996 tCO_2 or 7% of the original estimated PDD reductions and as such is not considered significant taking into account changes in the monitoring plan.

A.8. Intended deviations or revisions to the monitoring plan:

There are several deviations from the monitoring plan as described in the PDD[1]. Changes to the monitoring plan are detailed in the table below:

Approved monitoring plan			*Revised monitoring plan*		
Item under revision	***Unit***	***Method of monitoring***	***Revised item***	***Unit***	***Method of monitoring***
1.EF_{red}	tCO_2/ MWh	Description: emission factor of Ukrainian grid for reducing projects. Source of data: PDD Version 3.3 dated 15th of March 2010. Section D Value of data applied: 0.896 Units in the Orders of NEIA for these are $kgCO_2$/kWh. These units were converted into tCO_2/MWh.	$EF_{red,y}$	tCO_2/ MWh	Description: CO_2 emission factor for 2nd voltage class grid connected power consumption in year *y* for JI project consuming electricity according to the Consumer class defining Order, approved by National commission of energy regulations from 13 of August 1998 #1052. Data applied: The following data is available: 2011 – 1.227 $kgCO_2$/kWh (NEIA Order #75 12/05/2011). Units in the Orders of NEIA for these are kgCO2/kWh. These units were converted into tCO2/MWh Reason for revision: According to the selected approach, the CO_2 emission factor for electricity consumed by the project activity in every year of the monitoring period has been fixed ex-ante based on the best available study at the time of PDD preparation. A new study of NEIA has become available – Order #75 "Consolidation of specific carbon emission factors' values for 2011".The new emission factors are higher than the ones used in the PDD and they influence project emissions. This is conservative. This parameter is monitored throughout the crediting period. It provides updated emission factor, which corresponds with current legislation of Ukraine. Improvement: The revision improves accuracy of ER calculations by providing updated emission factor, which corresponds with current legislation of Ukraine. The most recent actual national emission factor is used.

[1] URL: http://ji.unfccc.int/UserManagement/FileStorage/0UCEPXDOJIM46WLT82F3VBSHAY7RK9 (last reference - 07/02/2012)

2. Data collecting scheme	-	Description:  	*Data collecting scheme*	-	Description:  Reason for revision: as the start-up of the project was delayed by 5 years, the changes in the HCP staff took place. This determined change of the person, responsible for project data collection. Moreover, according to the revisions in the PDD energy generated by CHP is not used by HCP due to the technical inconvenience of such reconstruction. For these reasons the improved scheme of data collection is provided in MR in the framework of current monitoring period. Improvements: this revision improves transparency by providing actual description of monitoring information flow.

3. $EL_{grid,y}$	MWh	Description: • Electricity consumed from the grid during maintenance of CHP in year y • Amount of electricity supplied to the grid which in the absence of project would have been generated by fossil fuels power plants Source of data: PDD Version 3.3 dated 15th of March 2010. Section D.	$EL_{PE,grid,y,}$ $EL_{BE,grid,y}$	MWh	Description: According to the approved monitoring plan in the PDD, two monitoring parameters are mentioned as $EL_{grid,y}$: • Electricity consumed from the grid during maintenance of CHP in year y • Amount of electricity supplied to the grid which in the absence of the project would have been generated by fossil fuels power plants Reason for revision: For distinguishing between these values, in calculations the following parameters were used: $EL_{BE,grid,y}$ - amount of electricity supplied to the grid which in the absence of the project would have been generated by fossil fuel power plants $EL_{PE,grid,y}$ - electricity consumed from the grid during maintenance of CHP in year y. Data is received in kWh and converted into MWh in calculating model. Improvements: This revision corrects formula used for BE and PE calculations by specifying grid electricity consumption and generation as different values. This improves accuracy and transparency of ER calculations.

4. EF_{prod}	tCO_2/ MWh	Description: emission factor of Ukrainian grid for producing projects. Source of data: PDD Version 3.3 dated 15th of March 2010. Section D Value of data applied: 0.807 Units in the Orders of NEIA for these are $kgCO_2$/kWh. These units were converted into tCO_2/MW	$EF_{prod,y}$	tCO_2/MWh	Description: CO_2 emission factor for thermal power plants energy production connected to Ukrainian united electricity systemReason for revision According to the selected approach, the CO_2 emission factor for electricity consumed by the project activity in every year of the monitoring period has been fixed ex-ante based on the best available study at the time of PDD preparation. In the meantime new order of NEIA has become available – *Order #75 "Consolidation of specific carbon emission factors' values for 2011"*. As this data is more recent and detailed it is used for the purpose of the monitoring. The new emission factors are higher than the ones used in the PDD and they influence project emissions. This parameter has been transferred from "Default values" section to "Variables" section, so further changes of monitoring legislative base will not cause changes in monitoring planSource of data: Order #75, provided by NEIA, from 12/05/2011. Values of data applied: The following data is available: 2011 – 1.063 $kgCO_2$/kWh (NEIA Order #75 12/05/2011). Units in the Orders of NEIA for these are $kgCO_2$/kWh. These units were converted into tCO_2/MWh.Improvements: The revision improves accuracy of ER calculations by providing updated emission factor, which corresponds current legislation of Ukraine. The last actual national emission factor is used.

5.$PE_{EL,y}$	tCO_2	Description: project emissions from electricity consumed by CHP's auxiliary equipment and consumed from the grid during maintenance of the CHP in year y. Source of data: PDD Version 3.3 dated 15th of March 2010. Section D. Formula: $PE_{EL,y} = EC_{PJ,y} \times EF_{CO2,EL,y}$ Where: $PE_{EL,y}$ – project emissions from electricity consumed by CHP's auxiliary equipment and consumed from the grid during maintenance of the CHP in year y (tCO_2). $EC_{PJ,y}$ – additional electricity consumed in year y as a result of the implementation of the project activity (MWh). $EF_{CO2,EL,y}$ – CO_2 emission factor for electricity consumed by the project activity in year y (tCO_2/MWh) Calculation of $EC_{PJ,y}$ is provided with the following formula: $EC_{PJ,y} = \Sigma EL\_CHP_{y,i} + EL_{PEgrid,y}$ Where:$EL\_CHP_{y,i}$ – electricity consumed by COG Power Plant's auxiliary equipment i in the year y (MWh); $EL_{PEgrid,y}$ – electricity consumed from the grid during maintenance of the CHP in year y (MWh)with $EF_{CO2,EL,y} = EF_{red}$.	$PE_{EL,y}$	tCO_2	Description: project emissions from electricity consumed by CHP's auxiliary equipment and consumed from the grid during maintenance of the CHP in year y. Reason for revision: In described project, emission factors for $EL\_CHP_{y,i}$ and $EL_{PE,grid,y}$ are not equal. As it is stated in the PDD, $EL\_CHP_{y,i}$ is produced carbon neutrally from waste gas, and $EL_{PE,grid,y}$ is imported from the grid. In order to calculate the $PE_{EL,y}$ this Formula was used: $PE_{EL,y} = \Sigma EL\_CHP_{y,i} \times EF_{CO2,EL,y} + EL_{PE,grid,y} \times EF_{red,y}$ Where: EF_{red} - CO_2 emission factor for 2nd voltage class grid connected power consumption in year *y* for JI project consuming electricity y, as it is consumed on the plant. As $EF_{CO2,EL,y} = 0$, $PE_{EL,y} = EL_{PE,grid,y} \times EF_{red,y}$ Improvements: Abovementioned changes improve accuracy of calculations by using applicable emission factor for carbon neutral electricity production.

Table 3. Changes to monitoring plan.

All changes to the monitoring plan, provided in this section, have been done with the aim of improvement of transparency, accuracy and applicability of formulae and data in MR. Formulae are corrected and fixed parameters are updated in accordance with the current available data. All proposed revisions correspond with the rules and regulations of the establishment of monitoring plan and the ACM0012 methodology.

A.9. Changes since last verification:

Not applicable.

A.10. Person(s) responsible for the preparation and submission of the monitoring report:

Position	*Responsibility*	*Name*
Leading Economist, ISTEK LLC	Monitoring data collection	Mavrodiy M.E.
Chief of Capturing Workshop, ISTEK LLC	Registration and reporting of monitored data from Automatic Control System (ACS)	Legeyda P.L.
Substitute of Head of Electricity Department, ISTEK LLC	Registration and reporting of monitored data from electricity meters	Ivanov D.S.
JI Consultant, Global Carbon	Preparation and support of monitoring report	Monchak O.O.

Table 4. Responsibilities.

SECTION B. Key monitoring activities according to the monitoring plan for the monitoring period stated in A.4.

For the monitoring period stated in A.4 following parameters have to be collected and registered:

1. **Electricity consumed from the grid during maintenance of CHP in year y**

   Parameter is measured by a two-directional electricity meter "SL 7000 Smart". "SL 7000 Smart" is based on microprocessor unit which indicates and meters the flow of electricity in two directions – sent to the grid and received from the grid. This meter registers all electric energy consumed by the project activity and all electricity, sent to the grid. Readings are used in the commercial dealings with the energy supply company. Monthly bills for electricity are available. The monthly and annual reports are based on the monthly bills data.

2. **Amount of electricity supplied to the grid which in the absence of project would have been generated by fossil fuels power plants**

   Parameter is measured with two-directional electricity meter "SL 7000 Smart". "SL 7000 Smart" is based on microprocessing unit which indicates and meters the flow of electricity in two directions – sent to the grid and received from the grid. This meter registers all electric energy consumed by the project activity and all electricity, sent to the grid. Readings are used in the commercial dealings with the energy supply company. Monthly bills for electricity are available. Regular cross-checks with the energy supply company are performed. The monthly and annual reports are based on the monthly bills data.

3. **Amount of COG, generated by HCP in the relevant period**

   This parameter is measured by gas flow metering system that includes:

   - multifunctional complex microprocessor pressure sensor "Metran - 100" VN-DD
   - multifunctional complex microprocessor pressure sensor "Metran - 100" Ex-DI
   - temperature sensor "Metran-204"

   "Metran-100" VN-DD measures COG pressure difference before and after the COG flow through the orifice. Pressure sensor "Metran - 100" Ex-DI modifies measurements into unified electric signal. All received data is automatically sent to certified automatic control system (ACS) where information is handled in real-time, recalculated and converted into[2] m^3/h or other units, depending on request. For calculating of cokes gas (COG) flow the Flow Compensation (FLOWCOMP) block of ACS is used. The FLOWCOMP operates on uncompensated flow measurements of COG and real-time variations of parameters. Readings of ACS are registered monthly in paper and electronic form.

B.1. Monitoring equipment types

1. Two-directional electricity meter "SL 7000 Smart", #53091642;
2. Pressure sensor "Metran-100" VN-DD, model 1412, #202427;
3. Pressure sensor "Metran -100" Ex-DI, model 1131, #235792;
4. Temperature sensor "Metran-204", #518147.

[2] m^3 of COG here and after are brought to following conditions: t = 20°C, P = 101325 Pa.

B.1.2. Table providing information on the equipment used (including manufacturer, type, serial number):

ID	*Parameter*	*Measuring/calculating instrument*	*Unit*	*Manufacturer*	*Type*	*Serial number*	*Accuracy class*
$EL_{PE,grid,y,}$ $EL_{BE,grid,y,}$	Electricity consumed from the grid during maintenance of CHP in year y; Amount of electricity supplying to the grid which in the absence of project would have been generated by fossil fuels power plants	Electronic two-directional electricity meter "SL 7000 Smart"	kWh For calculations data is converted to MWh	Itron Ukraine	SL761B071	53091642	0.5s
$Q_{COG,y}$	Gas pressure	Pressure sensor "Metran - 100" Ex-DI	kPa	Private joint-stock commercial group "Metran-Smart"	1131	235792	0.5s
	Pressure difference	Pressure sensor "Metran - 100" Vn-DD	kPa	Private joint-stock commercial group "Metran-Smart"	1412	202427	0.5s
	Temperature	Temperature sensor "Metran-204"	C°	Private joint-stock commercial group "Metran-Smart"	Copper resistance temperature sensor with unified outgoing signal	518147	±0.5%

Table 5. Equipment used for monitoring activities.

Basic chart of metering points is provided in Annex 2.
Calibration of the metering devices and equipment are to be conducted on a periodic basis according to the procedures of the Host Party.

B.1.3. Calibration procedures:

Measuring instrument	*Calibration interval in years*	*Last calibration*	*Body, responsible for calibration and certification*
Electricity meter SL761B071 "SL 7000 Smart" #53091642	6	State calibration 4Q2009 Technical calibration 18/10/2011	SOE "Donetskstandartmetrologiya"
Pressure sensor "Metran - 100" #202427	3	05/08/2011	SOE "Donetskstandartmetrologiya"
Pressure sensor "Metran - 100" #235792	3	21/11/2011	SOE "Donetskstandartmetrologiya"
Temperature sensor "Metran-204" #518147	1	27/12/2011	SOE "DonORGRES"

Table 6. Calibration.

B.1.4. Involvement of Third Parties:

SOE "Donetskstandartmetrologiya", SOE "DonORGRES"– calibration of the metering equipment.

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

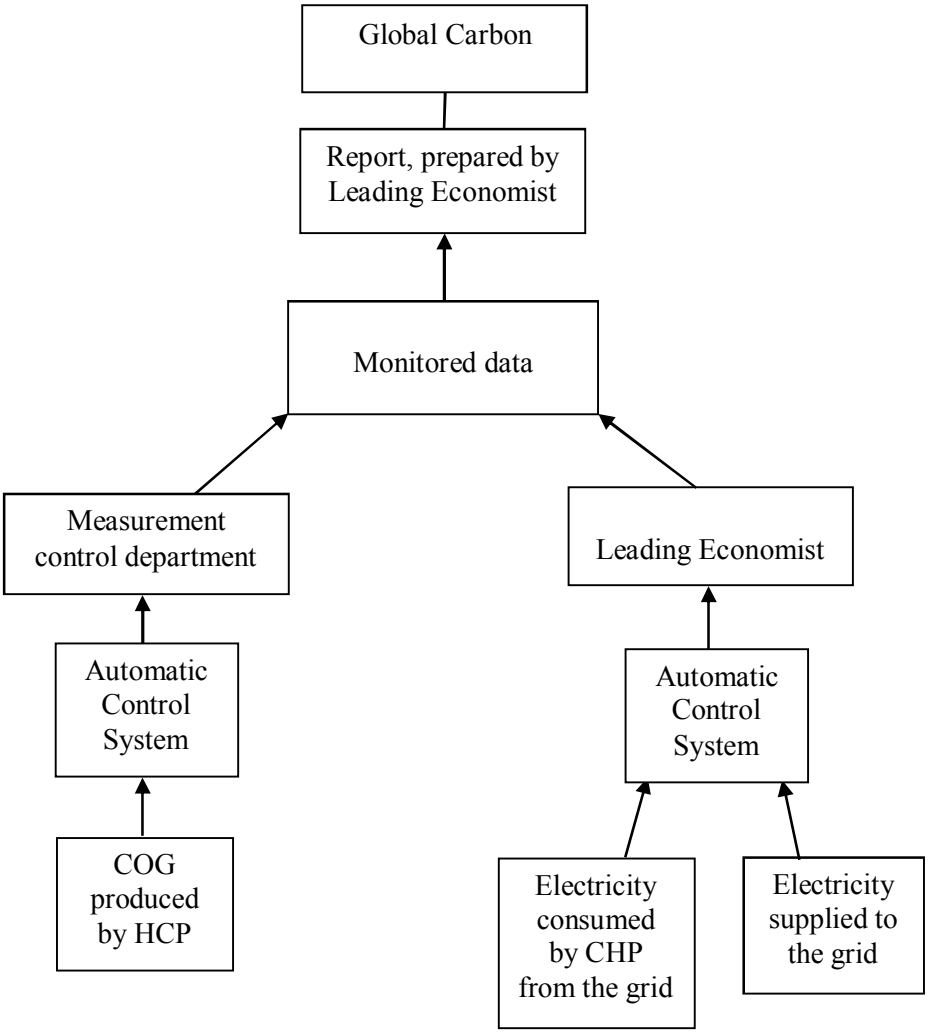


Figure 1: Data collection.

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

ID from PDD	Parameter	Data unit	Description	Data Source	Value
14	$Q_{COG, BL}$	m³	Amount of COG generated prior to the start of the proposed project (per year)	PDD version 3.3, Annex 2	187 478 016
-	f_{wcm}[3]	ratio	Fraction of total electricity, generated by the project activity using waste energy .	PDD version 3.3, Section D.1.1.3	1
-	$PE_{AF,y}$[4]	tCO_2	Emissions from on-site consumption of fossil fuels by co-generation plant(s), in case they are used as supplementary fuels, due to non-availability of waste energy to the project activity or due to any other reason.	PDD version 3.3, Section D.1.1.2	0
-	$PE_{EL,Import,y}$[5]	tCO_2	Project activity emissions from import of electricity replacing captive electricity generated in the absence of the project activity for Type 2 project activities (ACM0012)	PDD version 3.3, Section D.1.1.2	0
-	$BE_{flst,y}$[6]	tCO_2	Baseline emissions from steam generation, if any, using fossil fuel that would have been used for flaring the waste gas in absence of the project activity.	PDD version 3.3, Section D.1.1.4	0
-	$BE_{Ther,y}$[7]	tCO_2	Baseline emissions from thermal energy (due to heat generation by element process) during the year y.	PDD version 3.3, Section D.1.1.4	0
11	EL_{HCP}[8]	MWh	Amount of electricity consumed by HCP's equipment, which in the absence of the project would have been imported from the grid	PDD version 3.3, Section D.1.1.3	0

Table 7. Fixed values

[3] as stated in methodology ACM0012, this fraction is 1, if electricity is generated by the project activity using waste energy.

[4] Not applicable, see PDD, Section D 1.1.2.

[5] Not applicable, see PDD, Section D 1.1.2. Project activity is related to Type 1.

[6] Not applicable, see PDD, Section D 1.1.4.

[7] Neglected, see see PDD, Section D 1.1.4.

[8] CHP does not provide electricity for HCP operations. See section A.7.

B.2.2. List of variables:

ID (from PDD)	*Parameter*	*Calculation method (Measured/Calculated)*	*Unit*	*Comment*	*Data aggregation frequency*	*Value*
16	$EF_{red,y}$ - CO_2 emission factor for 2nd voltage class grid connected power consumption in year *y* for JI project consuming electricity	C - Calculated by the DFP on the annual basis	tCO_2/ MWh	Calculated by the DFP on the annual basis. The data will be archived and kept for two years after the last transfer of ERUs from the project	Data is aggregated every year by collecting the publicly available information	1.227
17	$EF_{prod,y}$ - CO_2 emission factor for thermal power plants energy production connected to Ukrainian united electricity system	C - Calculated by the DFP on the annual basis	tCO_2/ MWh	Calculated by the DFP on the annual basis. The data will be archived and kept for two years after the last transfer of ERUs from the project	Data is aggregated every year by collecting the publicly available information	1.063
-	$EL_{PEgrid,y}$ - Electricity consumed from the grid during maintenance of CHP in year y	M - Measured continuously by the specialised meter. Summarized monthly by calculation	MWh	The data will be archived and kept for two years after the last transfer of ERUs from the project	Data is aggregated monthly by a responsible person	347

Table 8. Monitored project emissions variables.

Baseline emissions variables to be monitored:

ID (from PDD)	***Parameter***	***Calculation method (Measured/Calculated)***	***Unit***	***Comment***	***Data aggregation frequency***	***Value***
15	$Q_{COG,y}$ - Amount of COG generated by HCP in year y	M/C Measured continuously by specialised meters and calculated by ACS	m^3	The data will be archived and kept for two years after the last transfer of ERUs from the project	Data is aggregated monthly by a responsible person	94 210 815
N/A[9]	$EL_{BEgrid,y}$ - Amount of electricity supplied to the grid, which in the absence of the project would have been generated by fossil fuel power plants	M - Measured continuously by the specialised meter.	MWh[10]	The data will be archived and kept for two years after the last transfer of ERUs from the project	Data is aggregated monthly by a responsible person	44 326

Table 9. Data collected in the baseline scenario

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

Variable	***Description. All data provided per 9 months***	***Units[11]***	***Value***
$EF_{CO2,EL,y}$	CO_2 emission factor for electricity consumed by the project activity in year *y*	tCO_2/MWh	0
$EL_{PEgrid,y}$	Electricity consumed from the grid during maintenance of CHP in year y	MWh	347

Table 10. Data collected in the project scenario

[9] Value is not mentioned in PDD and appears in PDD as $EL_{grid,y.}$

[10] Value is measured in kWh. For convenience in calculations here and after it is converted to MWh.

[11] Values are measured in kWh. For convenience in calculations here and after these are converted to MWh.

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

Variable	*Description. All data provided per 9 months*	*Units*	*Values*
$EL_{BEgrid,y}$	Amount of electricity supplying to the grid, which in the absence of the project would have been generated by fossil fuel power plants	MWh	44 326
$Q_{COG,y}$	Amount of COG generated	m^3	94 210 815

Table 11. Data collected in the baseline scenario

B.2.5. Data concerning leakage:

According to the PDD the project activity does not result in a leakage.

B.2.6. Data concerning environmental impacts:

According to Ukrainian legislation, an Environmental Impact Assessment (EIA), as a part of the project design documents, has been done for the proposed project and approved by local authority. Analysis of this document shows that introduction of the CHP will have following environmental impacts:

- Decreasing of the CO concentration in the flue gases of the coke battery
- Afterburning of the H_2 and C_mH_n
- Decreasing of the solid carbonaceous up to 75%.

According to calculations made in EIA, emissions of air pollutants will be reduced up to 1300 tonnes per year after startup of the CHP. EIA states, that abovementioned changes should reduce concentration of air polluting substances in the lower atmosphere layer on around 15-20%.

CHP consumes technical water from S. Donets Channel – for technical needs, and drinking water from state water supply system. Project water treatment system and waste water use does not influence harmfully water environment.

Construction of the proposed CHP was done at the premises of HCP and does not require any felling of the green plantation or influence on the ground.

Extracts of important sections of EIA are available to the Accredited Independent Entity (AIE) by request.
As it could be seen from EIA proposed project improves environmental conditions of the region

B.3. Data processing and archiving (including software used):

All data will be archived in electronic and paper form. Data acquisition and processing procedure for each parameter monitored:

1. **Electricity consumed from the grid during maintenance of CHP in year y.**

   This parameter is documented in the monthly invoices for the electric energy internal technical reports. The documents are collected every month by the responsible person (see section C.1.1). The paper originals are signed by both sides of contractors and binded into the special folder. In the end of the month the summarizing report is prepared containing the information on the monthly monitored data. This report is signed by the responsible person and is submitted to the director of the company. In the end of the year the annual summarizing report is prepared for all monitoring parameters containing monthly and annual figures. This report is submitted to the director of the company. These reports are

kept in electronic form in the IT system of the company and in paper form with signatures of the responsible persons.

2. **Amount of electricity supplied to the grid which in the absence of the project would have been generated by fossil fuel power plants.**

   Parameter is documented in the monthly invoices for the electric energy internal technical reports. The documents are collected every month by the responsible person (see section C.1.1). The paper originals are signed by both sides of contractors and binded into the special folder. In the end of the month the summarizing report is prepared containing the information on the monthly monitored data. In the end of the year the annual summarizing report is prepared for all monitoring parameters containing monthly and annual figures. This report is submitted to the director of the company. These reports are kept in electronic form in the IT system of the company and in paper form with signatures of the responsible persons.

3. **Amount of COG generated by HCP in the relevant period.**

   Amount of COG is calculated by the ACS unit. These readings are registered by responsible person and collected by the accounting and economics department on a monthly basis. Data on COG production is logged into the electronic register that is maintained at the head office of the company. In the end of the month the summarizing report is prepared containing information on the monthly monitored data. In the end of the year the annual summarizing report is prepared for all monitoring parameters containing monthly and annual figures. This report is submitted to the director of the company. These reports are kept in electronic form in the IT system of the company and in paper form with signatures of the responsible persons.

B.4. Special event log:

Special event has taken place during the monitoring period on the Horlivka cokes plant ISTEK LLC on 12/10/2011. Electricity meter SL 7000 Smart #53091642, which measures CHP electricity, sent to the grid ($EL_{BE,grid,y}$) has malfunctioned and was not operational for 5 hours – from 9:41 till 14:41.

Different electrical meter has been used to provide measurements of the relevant parameter during this time period. Internal technical electricity meter (SL 7000 Smart SL761, #53061331) which measures CHP electricity output before the step-up transformer connected to the grid has been used. Measurements from all electricity meters are collected and logged at the beginning and the end of the shift - 7:00 and 19:00. As the transformer is also an electricity consumer, the following formula was used for calculation of lost data:

$EL_{lost} = EL_{inner} - EL_{trans,av}$

Where

EL_{lost} – amount of electricity, generated by CHP, sent to the grid and not counted by SL 7000 Smart electricity meter on 12/10/2011 from 9:41 till 14:41.

EL_{inner} – amount of electricity, generated by CHP and accounted by internal electricity meter before the transformer on 12/10/2011, from 9:41 till 14:41.

$EL_{trans,av}$ – average electricity consumption of transformer, counted for 5 hours.

As the readings of electricity meter SL 7000 Smart #53091642 are revised and authorised by the buying party, this event and way of electricity accounting is documented, agreed and signed by SOE "Energorynok" and Leading Economist of HCP.

After the special event, additional technical calibration of electricity meter SL7000 Smart #53091642 was performed. Procedure is documented in Act 19010, dated 18/10/2011.

SECTION C. Quality assurance and quality control measures.

C.1. Documented procedures and management plan:

C.1.1. Roles and responsibilities:

Person responsible for collection, registration, visualization and providing monitoring data to Global Carbon is Leading Economist. Deputy Chief of Electricity department is responsible for collecting and archiving measurements of electricity meters and maintaining the energy equipment and transformers. A specialized technician team, headed by Safety Engineer is responsible for preventive measures, safety and maintenance of all technological equipment. Chief of Capturing department is responsible for collecting and archiving data from ACS. The raw reporting documents are collected and compiled on-site.

Information is stored in the archive of the company in both electronic and paper form. Raw documents are stored in the archive in paper form. Monthly and yearly summary reports are prepared for every parameter.

C.1.2. Trainings:

All technical staff of the company has annual training according to safety requirements. Employees of the project company get regular safety briefings and trainings. Training includes safety instructions, fire protection, electric equipment safety and technology of operations. All personnel, working with ACS, have corresponding training certificates, available upon request. Trainings and testing are provided either by the external training facility or in-house.

C.2. Involvement of Third Parties:

SOE "Donetskstandartmetrologiya" and SOE "DonORGRES" are third parties involved.

C.3. Internal audits and control measures:

Internal cross-checks and audits are performed for all of the data monitored as the raw documents used for monitoring are also used in the commercial dealings of the company. Director of the company reviews monthly and yearly reports and conducts selective cross-checks with the raw documents.

For the fixed data and ex-ante parameters and factors the quality assurance requires to check that the data were acquired from the reliable (i.e. recognised and/or based on research), verifiable (data are open for access, or are available for the project participants) sources. Cross check of COG generation is available. Amount of electricity received from the grid and sent to the grid is monitored and approved by both parties. If inconsistencies are found the dispute can be open between two parties and a thorough check of underlying work-orders, measurement logs and other documentation of the third party can follow.

C.4. Troubleshooting procedures:

All exceptional and troubleshooting events are documented by internal notes.

SECTION D. Calculation of greenhouse gases (GHG) emission reductions.
Table providing the formulas used:

ID	*Index*	*Description*	*Formula*	*Units*
-	$PE_{EL,y}$	Project emissions from electricity consumed by CHP's auxiliary equipment and electricity consumed from the grid during maintenance of CHP in the year y	[12] $PE_{EL,y} = EL_{PE,grid} \times EF_{red,y}$	tCO_2
-	$Q_{COG,BL,y}$	Baseline equivalent of amount of COG generated in the year y	$Q_{COG,BL,y} = \frac{Q_{COG,BL}}{12} \times 9$	m^3
1	PE_y	Project Emissions due to project activity in the year y	$PE_y = PE_{AF,y} + PE_{EL,y} + PE_{EL,Import,y}$	tCO_2
13	f_{cap}	Energy that would have been produced in project year y using COG generated in base year expressed as a fraction of total energy produced using COG in year y	$f_{cap} = \frac{Q_{COG,BL,y}}{Q_{COG,y}}$	ratio
10	$BE_{Elec,y}$	Baseline emissions due to displacement of electricity during the year y	$BE_{Elec,y} = f_{cap} \times f_{wcm} \times (EL_{HCP,y} \times EF_{red} + EL_{BE,grid,y} \times EF_{prod,y})$	tCO_2
9	$BE_{En,y}$	Baseline emissions from energy generated by project activity during the year y	$BE_{En,y} = BE_{Elec,y} + BE_{Ther,y'}$	tCO_2
8	BE_y	Baseline emissions in the year y	$BE_y = BE_{En,y} + BE_{flst,y}$	tCO_2
	ER_y	Emission reductions	$ER_y = BE_y + PE_y$	tCO_2

Table 12. Calculation formulae.

[12] Formula does not appear in PDD. Substantiation for this formula are detailed in Section A.8.

D.2. Description and consideration of measurement uncertainties and error propagation:

All measurement uncertainties and error propagation of the measured parameters are according to the manuals of equipment manufacturers. Uncertainty level of the fixed values and external data are low as they are taken from reliable and publicly available, verifiable sources.

D.3. GHG emission reductions (referring to B.2. of this document):

D.3.1.c Project emissions:

Data	*Unit*	*Value*
PE	tCO_2	425

Table 13. Project emissions.

D.3.2. Baseline emissions:

Data	*Unit*	*Value*
BE	tCO_2	47 118

Table 14. Baseline emissions.

D.3.3. Leakage:

Not Applicable.

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

Data	*Unit*	*Value*
ER	tCO_2	46 693

Table 15. Emission reductions.

Annex 1

Definitions and acronyms

Acronyms and Abbreviations:

ACS	AUTOMATIC CONTROL SYSTEM
AIE	ACCREDITED INDEPENDENT ENTITY
CHP	COHENERATING HEAT AND POWER PLANT
CO_2	CARBON DIOXIDE
COG	COKE OVEN GAS
EIA	ENVIRONMENTAL IMPACT ASSESMENT
ER	EMISSION REDUCTIONS
FLOWCOMP	FLOW COMPENSATION
GHG	GREENHOUSE GASES
HCP	HORLIVKA COKES PLANT
NEIA	NATIONAL ENVIRONMENTAL INVESTMENT AGENCY
PDD	PROJECT DESIGN DOCUMENT

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.
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).

Annex 2

Location of Measurement Points and Devices