SECOND PERIODIC MONITORING REPORT

Version 1.0
12 April 2011

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SECTION A. General project activity information

A.1 Title of the project activity:

"Reconstruction of Units1,2,3 and 4 at Zuyevska Thermal Power Plant", Ukraine.

Date: 12 April 2011

Version: 1.0

A.2. JI registration number:

0198

A.3. Short description of the project activity:

The proposed project is aimed at increasing the fuel efficiency, reliability, and availability of all four coal fired units at Zuyevska TPP, which belong to the DTEK holding company, Ukraine. The TPP has four identical conventional condensing steam turbine units of 300 MW each. They were commissioned in 1982, 1986, and 1988, and as such, the TPP can be considered as one of the newest coal fired TPPs connected to the grid.

Implementation of the proposed project activity allows to generate electric energy with higher efficiency, thus reducing the amount of combustion of fossil fuels (mainly coal) significantly below the level of what would happen in the absence of the proposed project. It directly results in reduction of GHG emission as well as emission of pollutants (dust, SO_x)

The proposed project is intended to modernise all four units at the TPP in order to:

- Improve energy efficiency and reduce auxiliary equipment consumption
- Improve reliability and availability
- Improve part-load efficiency
- Introduce modern control systems
- Reduce the dust emission
- Reduce SO_x emission

The design solutions proposed for project implementation reflect the good engineering practices provided by major local and international equipment manufacturers.

The solutions allow increasing the efficiency of the existing power plant equipment to a level higher than foreseen by the original design. They represent state of the art modernisation technology which could be applied over the existing power plant equipment.

The scope of reconstruction of each of the units is generally identical, and differs only in details.

Plant auxiliaries, common for all units are involved in the reconstruction as well. Flue gas desulfurization (FGD) plant is also included, and it is planned at this stage to be common for Units #1, 3, and 4, with Unit #2 having an individual FDG plant.

The unit reconstruction consists of the following packages of individual measures:

1. Modernisation of steam turbine generator (STG), including:

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   a. Reconstruction of low pressure cylinder of STG, replacement and modernisation of STG auxiliaries
   b. Rehabilitation of high and middle pressure STG cylinders
   c. Rehabilitation of regeneration equipment and vacuum system
   d. Retrofit of alternator cooling system
2. Rehabilitation of the boiler
3. Modernisation of the unit control system
4. Rehabilitation of the unit step-up transformer
5. Modernisation of switch room equipment, partial replacement of circuit breakers
6. Improvement of ESP (electrostatic precipitators) operation
7. Plant auxiliaries modernisation (mailnly plant cooling part, which includes cooling tower, cooling water supply and return channels).

Expected results

It is expected that under normal operating conditions the specific fuel consumption of the plant will be decreased from current value of approximately 10.523 to some 10.04 GJ/MWh. This will allow operation of TPP units with high efficiency for a long period without the need to replace or substitute the equipment by more efficient one within the project period.

Since the main process of electricity production stays the same, it is not expected that operation and maintenance of equipment will represent difficulties for plant personnel. Some new equipment, like control and instrumentation, however would require initial training of staff. This will be provided by the respective suppliers.

The map below indicates the position of the project activity in Ukraine, near Zugres village, located about 40 km west of Donetsk, the regional capital of Donetsk Oblast in Southwest Ukraine:

Figure 1: Ukraine, the project location and neighbouring countries

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A.4. Monitoring period:

- Monitoring period starting date: 01.01.2010 at 00:00;
- Monitoring period closing date: 28.02.2010 at 24:00

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

A.5.1. Baseline methodology:

A JI specific approach regarding baseline setting and monitoring has been developed in accordance with Appendix B of the JI Guidelines and with the JISC Guidance. This specific approach will use some elements of CDM methodology AM0061.
The baseline is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project[1]. Plausible future scenarios are identified and listed on the basis of conservative assumptions (paragraph 21 (b) of the Guidance). The proposed project, not developed as a JI project, has been included as one of the alternatives. These alternatives are assessed as credible or plausible, and the most plausible is identified as the baseline. The consistency between the baseline scenario determination and additionality determination has been checked.
The proposed approach is being applied through the following three steps:

1. Identification of a baseline in accordance with paragraphs 21-26 of the Guidance;
2. Additionality demonstration in accordance with the most recent version (version 05.2) of the "Tool for the demonstration and assessment of additionality";
3. Calculation of emissions of the baseline scenario.

The proposed approach allows reducing the uncertainties by using of historically recorded data as well as parameters measured in the project scenario for the baseline. The usage of values measured with high accuracy (electricity and fuel) and IPCC default factors is foreseen.

The conservativeness of the baseline is safeguarded by not taking into account the degradation of efficiency of the plant over time.

Uncertainty is reduced by taking average historical plant operation records for the extended period of seven years preceding the project start.
The emissions in the baseline scenario occur due to combustion of fossil fuels in the boilers of the TPP units to run the steam turbines and produce power for the grid. Part of the power generated is used to drive the auxiliary systems of the units and of the TPP. The net power supplied to the grid for producing electricity and heat EL_y and the net fuels consumption FC_y are the two major indicators of the plant efficiency.
The following assumptions were made:

- The TPP is supplying to the grid the same amount of electricity in both, baseline and project scenarios.
- Same fuel types (coal, natural gas and heavy fuel oil (mazut)) and their actual proportion will be used in baseline and project scenario;
- Actual recorded NCV of fuels will be used in baseline and project scenario

[1] JI guidelines, appendix B

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A.5.2. Monitoring methodology:

The project activity only affects the emissions due to combustion of fuels in the boilers of plants units 1, 2, 3 and 4. Therefore, in order to monitor the project emissions a JI specific approach was proposed which foresees monitoring of:

- fuels consumption for producing electricity and heat by the TPP (including the NCV of each particular fuel used);
- amount of electricity supplied to the grid.

These values are metered and stored allowing for reliable and transparent monitoring.

The baseline emissions are established in the following way (details see in Annex 2 PDD ver.2.8):

1. The Specific Fuel Consumption (SFC_{BSl}) in the baseline for the whole TPP was constantly monitored with monthly and annual reporting; the reporting forms are created and stored. The SFC is expressed in grams of coal equivalent/MWh supplied to the grid and will be converted to GJ/MWh.
2. SFC in the baseline was fixed ex-ante based on seven years (2002-2008) average data of: power supplied to the grid, fuels consumption for producing electricity and heat taking into account the amount of each fuel and its NCV.

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Baseline emissions calculation

ID	Data type	Data variable	Data unit	Measured M Calculated C Estimated E	Recording frequency	Proportion of data to be monitored	Data recording	Archived data	Comment
1.	GHG emissions	**BE_y,** Baseline emissions in the year y.	tCO_2	c	Yearly	100%	Electronic and paper	At least two years after last Carbon Credit delivery (April 2013)	Calculated using the formulae in Section D.1.1.2 of the PDD
2.	GHG emissions	**$BE_{Fuel,\ y,}$** , Baseline CO_2 emissions due to combustion of fossil fuels in the boilers of TPP	tCO_2	c	Yearly	100%	Electronic and paper	At least two years after last Carbon Credit delivery (April 2013)	Calculated using the formulae in Section D.1.1.2 of the PDD
3.	Electricity generation	**EL_y**, Annual amount of electricity supplied by TPP to the grid in year y	MWh	m	Continuously	100%	Electronic and paper	At least two years after last Carbon Credit delivery (April 2013)	

Table 1:Baseline emissions

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The project emissions will be obtained by monitoring of actual fuels consumption for producing electricity and heat taking into account the amount of each fuel and its NCV.

Project emissions calculation

ID	Data type	Data variable	Data unit	Measured M Calculated C Estimated E	Recording frequency	Proportion of data to be monitored	Data recording	Archived data	Comment
4.	Project emissions	**PE_y** , Project emissions in year y	tCO_2	c	Yearly	100%	Electronic and paper	Two years after last Carbon Credit delivery (April 2013)	Calculated using the formulae in Section D.1.1.1 of the PDD
5.	Project emissions	**$PE_{Fuel,y}$**, Project emissions due to combustion of fossil fuel in the boilers of TPP in year y	tCO_2	c	Yearly	100%	Electronic and paper	Two years after last Carbon Credit delivery (April 2013)	Calculated using the formulae in Section D.1.1.1 of the PDD
6.	Fuel consumption	**$FC_{i,y}$**, Fuel of type *i* consumed during year y for producing electricity and heat	*Tonnes or thousands* Nm^3	*m/c*	*Regularly, for natural gas continuously*	*100%*	Electronic and paper	Two years after last Carbon Credit delivery (April 2013)	
7.	Callorific value	**$NCV_{i,y}$**, Net calorific value of fuel type *i* during year y	GJ/ton or per thousand Nm^3	*m/c*	*Regularly; for NG monthly, for coal and mazut every 5 days average*	*100%*	Electronic and paper	Two years after last Carbon Credit delivery (April 2013)	*Plant laboratory accredited to conduct NCV tests of coal and liquid fuel. Gas NCV is provided by supplier of gas*

Table 2:Project emissions

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Assumptions:

- The technical lifetime of the existing equipment to at least the end of the crediting period;
- Electricity supply to the grid is the same in baseline and project scenario;
- Same fuel types (coal, natural gas and heavy fuel oil (mazut)) will be used in baseline and project scenario;
- Actual NCV of fuels will be used in baseline and project scenario;
- The carbon emissions factors of each of fuels type the IPCC default data will be used.
- The thermal energy produced by the project activity power plant is used only for heating the premises of the TPP and dwellings of plant personnel in an adjacent village. The amount of thermal energy is not influenced by the project.

General remarks:

For the greenhouse gas emissions only the CO_2 emissions are taken into account. The CH_4 and N_2O emission reductions will not be claimed similarly to ACM0061. This approach is conservative.

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

The project activity started on the 31st of December 2008 with first start of the reconstructed unit #2. It was expected in PDD (table 2) that the next scheduled unit #1 to start operation in December 2009. Actualy the unit (#1) was started after reconstruction on 18 December 2009 and is being operated in precomissioning mode. The regular operation is expected to begin in the third quarterof 2011. Within the first commitment period of 2008-2012 the following schedule is planned:

Start of Unit #4 after reconstruction	April 2012
Start of Unit #3 after reconstruction	April 2013

After completion of the last unit (#3) the project will operate at full scale.

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

Clarifies the definition of a data variable $\mathbf{FC_{i,\,y}}$, as “fuel of type *i* consumed during year y for producing electricity and heat “ instead of “fuel of type *i* consumed during year y”. Data source and variable in PDD and in the last monitoring period is not changed.

Clarifies the definition of a data variable $\mathbf{SFC_{Bsl}}$, as “baseline specific overal (for producing electricity and heat) fuel consumptionfor supply of power to the grid (station heat rate)“ instead of “baseline specific fuel consumption for supply of power to the grid (station heat rate)”. Data source and variable in PDD and in the last monitoring period is not changed.

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The value **$EF_{CO2,mazut}$**, Heavy oil emission factor and **$EF_{CO2,coal}$**, Sub-bituminous coal emission factor clarifies according to the *Default factor, 2006 IPCC Guidelines V.2-Energy, Table 1.4* http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf.

Formula is given in the text of the PDD (formula number 4, p. 31) to calculate **$BE_{Fuel, y}$** the baseline CO_2 emissions due to combustion of fossil fuels in the boilers of TPP (tCO_2) is not mathematically correct and consistent Calculation Spreadsheet of emissions reductions was made in Excel .

$$BE_{Fuel,y} = SFC_{Bsl} \times \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO_2 i,y} \right)}{\sum_i \left(FC_{i,y} \times NCV_{i,y} \right)} \times EL_y$$

Where:
SFC_{BSL} is the baseline specific fuel consumption for supply of power to the grid (station heat rate) (GJ/MWh)
$FC_{i, y}$ is the fuel of type i (coal, natural gas and heavy fuel oil (mazut)) consumption during the year y (tons)
$EF_{CO2,I,y}$ is the carbon emission factor of fuel of type i during the year y (tCO_2/GJ)
$NCV_{i, y}$ is the net (lower) calorific value of fuel of type i during the year y (GJ/ton)
EL_y is the annual amount of electricity supplied by TPP to the grid in year y (MWh)
Emissions reductions calculated by this formula are different from the actual emission reductions achieved, calculated in a Calculation Spreadsheet, which actually describes a computational model. As a result of due diligence were determined mathematically correct formula is given by

$$BE_{Fuel,y} = \sum_i \left[\frac{0.0293076 \times SFC_{Bsl} \times EL_y \times FC_{i,y} \times NCV_{i,y} \times EF_{CO_2 i,y}}{\sum_i \left(FC_{i,y} \times NCV_{i,y} \right)} \right]$$

Where:
0.0293076 = conversion factor from g.c.e./kWh into GJ/MWh
SFC_{Bsl} = the baseline specific fuel consumption for supply of power to the grid (plant heat rate) (g.c.e/kWh)
EL_y = the annual amount of electricity supplied by TPP to the grid in year y (MWh)
$FC_{i, y}$ = the fuel of type i (coal, natural gas and heavy fuel oil (mazut)) consumption during the year y (tons)
i = 1 (coal); 2 (gas); 3 (mazut)
$NCV_{i, y}$ = the net (lower) calorific value of fuel of type i during the year y (kcal/kg or per Nm^3)
$EF_{CO2,I,y}$ = the carbon emission factor of fuel of type i during the year y (tCO_2/GJ)
Changing the formula does not lead to any change in the level of emission reductions in the previous and the next monitoring period because all the calculations were

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performed using the model of Excel. This amendment is more editorial in nature and generally resulted in improved quality of documentation.

Due to lack of funding start of Unit # 4 after retsonstrutstion delayed until April 2012 and start of Unit # 3 delayed until April 2013.

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

No deviations or revisions to the registered monitoring plan are made or intended. It is

A.9. Changes since last verification:

N.A.

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

Zuyevska TPP

- Evgeny Zheleznyak, head of process department (PTO)

DTEK

- Aleksey Mikhailov, leading specialist, department of power generation

Global Carbon B.V.

- Natallia Belskaya, JI Consultant, Global Carbon BV

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

The project activity only affects the emissions due to combustion of fuels in the boilers of plants units 1, 2, 3 and 4. Therefore, for the purpose of establishing the baseline emissions and in order to monitor the project emissions a JI specific approach was proposed which foresees monitoring of:

- fuels consumption by the TPP (measuring the amouts of fuels consumed, their NCV and calculating the heat content of fuels used;
- amount of electricity supplied to the grid.

These values are metered and stored allowing for reliable and transparent monitoring.

Data are measured, processed and stored by respective departments of the TPP as described in section B.3. Standard plant reporting from 3-TEH (approved standard form according methodological guidelines GKD 34.09.103-96) is prepared on daily, mothly and yearly basis. The form contains amounts of power generated by each unit, power consumed by plant/unit auxiliaries, power exported to grid, total fuel consumption and its breakdown by fuel types, number of run and idle hours of equipment, number of starts, heat rate of steam turbogenerators, efficiency of boilers, boilers heat losses, steam, air temperatures and other detailed operational data.

3-TEH is a standard reporting form used in power industry.

The plant process department (PTO) is responcible for collecting, processing the data and producing the 3-TEH form on a regular basis.

B.1. Monitoring equipment:

Supply of power to the grid

The power produced by each of four plants alternators is measured by four individual meters located at each of the unit step-up transformers.

Part of power produced is used to feed the unit and plant auxiliary systems at 6 kV voltage.

The amount of power consumed by auxiliaries is measured by 8 individual meters located after four auxiliary transformers, two meters per each transformer.

Each of the meters is a modern electronic type device of high accuracy (class 0.2 for power generation and 0.5 or better for auxiliary consumption). Each meter has a back up meter installed of same accuracy.

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Separately, the amount of power consumed by back-up excitation system is measure by individual meter.
The net power supplied to the grid EL_y is obtained by subtraction of power used to feed auxiliaries (including the back-up excitation) from the amount of power produced.

Consumption of coal
The coal is supplied to the TPP by rail and stored at the coal storage. The amount of coal received is measured by railway wagon scales. A measurement of coal consumed by all four units of the TPP is done by conveyor belt scales when the coal is being transported from coal storage to the coal milling department after which powdered coal is supplied to each of the units. The coal is being transported by two parallel belt conweyors ЛК-2А and ЛК-2Б and the daily consumption is recorded by fuel department in paper form and transferred to process department where it is stored and used for daily control.

Consumption of gas
Consumption of natural gas is metered by flow meter Flowtek-2 installed at gas pressure reducing station owned by gas suppliers. It is a meter sertified as commercial metering device used for billing the power plant for gas consumed. Data are recorded and stored and constantly reported to the TPP.

Consumption of heavy fuel oil (mazut)
Heavy fuel oil is supplied to the TPP by rail cisterns and it is stored in reservoirs from which it is pumped into fuel pipeline connected to the units. Consumption of heavy fuel oil is metered by measurement of level in the reservoirs 3 times a day (each shift). The daily volumetric consumption is recalculated to mass units. The data are recorded and transferred from fuel department to process department where has been stored and also used for daily control.

Measurement of NCV of fuels
The NCV of coal, natural gas and heavy fuel oil is measured by TPP laboratory. The samples of coal are taken four times an hour, mixed together and are kept for testing which is carried out every 5 days.This provides measurement of the average coal NCV for 5 days. Testing of natural gas and heavy fuel oil is carried out every five days. For billing the gas suppliers data are used (montly NCV certificates).

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B.1.2. Table providing information on the equipment used (incl. manufacturer, type, serial number, date of installation, date of last calibration, information to specific uncertainty, need for changes and replacements):

Equipment, location	Meter abbreviation	Manufacturer/ type	Serial number	Unit	Installation date	Accuracy	Last calibration	Next calibration	Comments
Power generated									
Power meter, Unit #1 alternator, 20kV	**Wh1**	Elster-Metronica EA02-RAL-C4	01147041	kWh	4Q2006	± 0.2 %	4Q2006	4Q2012	
Power meter, Unit #2 alternator, 20kV	**Wh2**	Elster-Metronica EA02-RAL-C4	01147080	kWh	4Q2006	± 0.2 %	4Q2006	4Q2012	
Power meter, Unit #3 alternator, 20kV	**Wh3**	Elster-Metronica EA02-RAL-C4	01147064	kWh	4Q2006	± 0.2 %	4Q2006	4Q2012	
Power meter, Unit #4 alternator, 20kV	**Wh4**	Elster-Metronica EA02-RAL-C4	01147039	kWh	4Q2006	± 0.2 %	4Q2006	4Q2012	
Power consumption for reserve excitation of alternators									
Power meter, 6 kV Section 1-A	**Wh5**	Elster-Metronica EA05-RL-C3	01147108	kWh	4Q2006	± 0.5 %	4Q2006	4Q2012	
Power consumption for power plant auxiliaries									
Power meter, TR 21 Sect A	**Wh6**	Elster-Metronica EA05-RL-C3	01147105	kWh	4Q2006	± 0.5 %	4Q2006	4Q2012	
Power meter, Auxiliary TR 21 Sect Б	**Wh6**	Elster-Metronica EA05-RL-C3	01147103	kWh	4Q2006	± 0.5 %	4Q2006	4Q2012	

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Power meter, Auxiliary TR 22 Sect A	**Wh8**	Elster-Metronica EA05-RL-C3	01147094	kWh	4Q2006	± 0.5 %	4Q2006	4Q2012	
Power meter, Auxiliary TR 22 Sect Б	**Wh8**	Elster-Metronica EA05-RL-C3	01147104	kWh	4Q2006	± 0.5 %	4Q2006	4Q2012	
Power meter, Auxiliary TR 23 Sect A	**Wh10**	Elster-Metronica EA05-RL-C3	01147096	kWh	4Q2006	± 0.5 %	4Q2006	4Q2012	
Power meter, Auxiliary TR 23 Sect Б	**Wh11**	Elster-Metronica EA05-RL-C3	01147095	kWh	4Q2006	± 0.5 %	4Q2006	4Q2012	
Power meter, Auxiliary TR 24 Sect A	**Wh12**	Elster-Metronica EA05-RL-C3	01147097	kWh	4Q2006	± 0.5 %	4Q2006	4Q2012	
Power meter, Auxiliary TR 24 Sect Б	**Wh13**	Elster-Metronica EA05-RL-C3	01147106	kWh	4Q2006	± 0.5 %	4Q2006	4Q2012	

Table 3: Power meters

Coal weigthing

Equipment	**Meter abbreviation**	**Manufacturer/ type**	**Serial number**	**Unit**	**Installation date**	**Accuracy**	**Last calibration**	**Next calibration**
Coal conveyor strain scales at conveyor ЛК-2А	MC#1	MICA, “ErMak ВЛ 2-2”	1757	ton	4/12/2008	± 0.5 %	26/10/2010	26/04/2011
Coal conveyor strain scales at conveyor ЛК-2Б	MC#2	MICA, “ErMak ВЛ 2-2”	1803	ton	4/12/2008	± 0.5 %	26/10/2010	26/04/2011

Table 4: Conveyor belt coal weight meters

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B.1.3. Calibration procedures:

For Electricity Meters:

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of such meters is 4 years for the meters produced before 01.01.1988 and 6 years for the meters produced after 01.01.1988.	Ukrainian Centre for Standardization and Metrology

For Natural Gas Flow Meters

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of such meters is 2 years.	Ukrainian Centre for Standardization and Metrology

For industrial scales:

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of such meters is 1 year.	Ukrainian Centre for Standardization and Metrology

B.1.4. Involvement of Third Parties:

Ukrainian Centre for Standardization and Metrology, State Donetsk regional centre for standartisation, metrology and certification (SE “Donetskstandartmetrology”)Donetskoblgas.

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

B.2.1. List of fixed default and baseline values:

Data variable	Source of data	Data unit	Value
$EF_{CO2,gas}$, Natural gas emission factor	Default factor, 2006 IPCC Guidelines , http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf, V.2-Energy, Table 1.4	tCO_2/GJ	0.0561
$EF_{CO2,mazut}$, Heavy oil emission factor	Default factor, 2006 IPCC Guidelines , http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf, V.2-Energy, Table 1.4	tCO_2/GJ	0.0774
$EF_{CO2,coal}$, Sub-bituminous coal emission factor	Default factor, 2006 IPCC Guidelines , http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf, V.2-Energy, Table 1.4	tCO_2/GJ	0.0961
SFC_{Bsl}, Baseline specific overal (for producing electricity and heat) fuel consumptionfor supply of power to the grid (station heat rate)	Fixed ex-ante in the PDD, see Annex 2 -calculations	GJ/MWh	10.5232 (359.059 g.c.e./kWh)[2]

Table 5: Project fixed default values

[2] g.c.e. is the abbreviation for gram of coal equivalent. 1 ton of coal equivalent=29.3076 GJ

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B.2.2. List of variables:

Data variable	Data unit	Method of calculation	Meters used
BE_y, Baseline emissions in the year y.	tCO_2	See formula 3 in section D	
$BE_{Fuel, y}$, , Baseline CO_2 emissions due to combustion of fossil fuels in the boilers of TPP	tCO_2	See formula 4 in section D	
EL_y, Annual amount of electricity supplied by TPP to the grid in year y	MWh	Measurement by power meters, calculation	Wh1-Wh6; Wh8; Wh10-Wh13.
PE_y , Project emissions in year y	tCO_2	See formula 1 in section D	
$PE_{Fuel,y}$, Project emissions due to combustion of fossil fuel in the boilers of TPP in year y	tCO_2	See formula 2 in section D	
$FC_{i, y}$, Fuel of type *i* consumed during year y for producing electricity and heat	*Tonnes or thousands* Nm^3		MC1 and MC2
$NCV_{i, y}$, Net calorific value of fuel type *i* during year y	GJ/ton or per thousand Nm^3	TPP laboratory measurements	

Table 6: list of varables

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

Period:			01.2010- 12.2010	01.2011	02.2011
FC_1	Coal consumption	tonnes	2 796 483	265 726	286 182
FC_2	Natural gas consumption	thousandsnm^3	21 518	2 104	1 576
FC_3	Mazut consumption	tonnes	0	0	0
NCV_1	Net calorific value of coal	kcal/kg	4718	4844	4878
NCV_2	Net calorific value of gas	kcal/ nm^3	8076	8067	8045
NCV_3	Net calorific value of mazut	kcal/kg	8763	8649	8649
$EF_{CO2,1}$	Carbon emission factor for coal	tCO_2/GJ	0.0961	0.0961	0.0961
$EF_{CO2,2}$	Carbon emission factor for gas	tCO_2/GJ	0.0561	0.0561	0.0561
$EF_{CO2,3}$	Carbon emission factor for mazut	tCO_2/GJ	0.0774	0.0774	0.0774

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Table 7: Data collected in projet scenario

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

Period:			01.2010- 12.2010	01.2011	02.2011
NCV_1	Net calorific value of coal	kcal/kg	4718	4844	4878
NCV_2	Net calorific value of natural gasG	kcal/ nm^3	8076	8067	8045
NCV_3	Net calorific value of mazut	kcal/kg	8763	8649	8649
$EF_{CO2,1}$	Carbon emission factor for coal	tCO_2/GJ	0.0961	0.0961	0.0961
$EF_{CO2,2}$	Carbon emission factor for gas	tCO_2/GJ	0.0561	0.0561	0.0561
$EF_{CO2,3}$	Carbon emission factor for mazut	tCO_2/GJ	0.0774	0.0774	0.0774
SFC_{Bsl}	Fixed baseline specific overal (for producing electricity and heat) fuel consumptionfor supply of power to the grid (station heat rate)	GJ/MWh	10.5232	10.5232	10.5232
SFC_{Bsl}	Fixed baseline specific overal (for producing electricity and heat) fuel consumptionfor supply of power to the grid (station heat rate)	g.c.e./kWh	359.059	359.059	359.059
EL_y	Amount of power supplied to grid	MWh	5 461 058	539 999	585 950

Table 8: Data collectedfor the baseline

B.2.5. Data concerning leakage:

Not applicable.

B.2.6. Data concerning environmental impacts:

Environmental impacts due to operation of Zuyevska TPP are monitored on a regular basis according to the environmental regulations in force. Applicable norm is the Law of Ukraine “On protection of ambient air” from 16.10.1992, № 2707-XII.

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Standart reporting form 2-TP is produced on regular basis and includes monitoring of TPP emissions of pollutants (dust, sulphur oxides and nitrogen oxides). The level of TPP emissions is within its operation licence (allowance). The environmental reporting and conformance to applicable norms in force is regularly checked by Donetsk branch of State Environmental inspection.

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

In regard of data processing and archiving the Management of Zuyevska TPP :

- Organizes monitoring (the appropriate orders and instructions may be issued, specifying the responsible executors, monitoring and reporting are carried out),
- Recording the required data, monitoring and reporting on the project GHG emissions at the TPP
- Operation of power plant equipment,
- Recording the required data, monitoring and reporting on the project GHG emissions at the TPP.
- All data archived will be kept for at least two years after the last transfer of ERUs to the client.

Person responcible for data collection and arhiving is Mr. Yevgeniy Zhelesnyak – head of PTO (procees) department of Zuyevskaya TPP.

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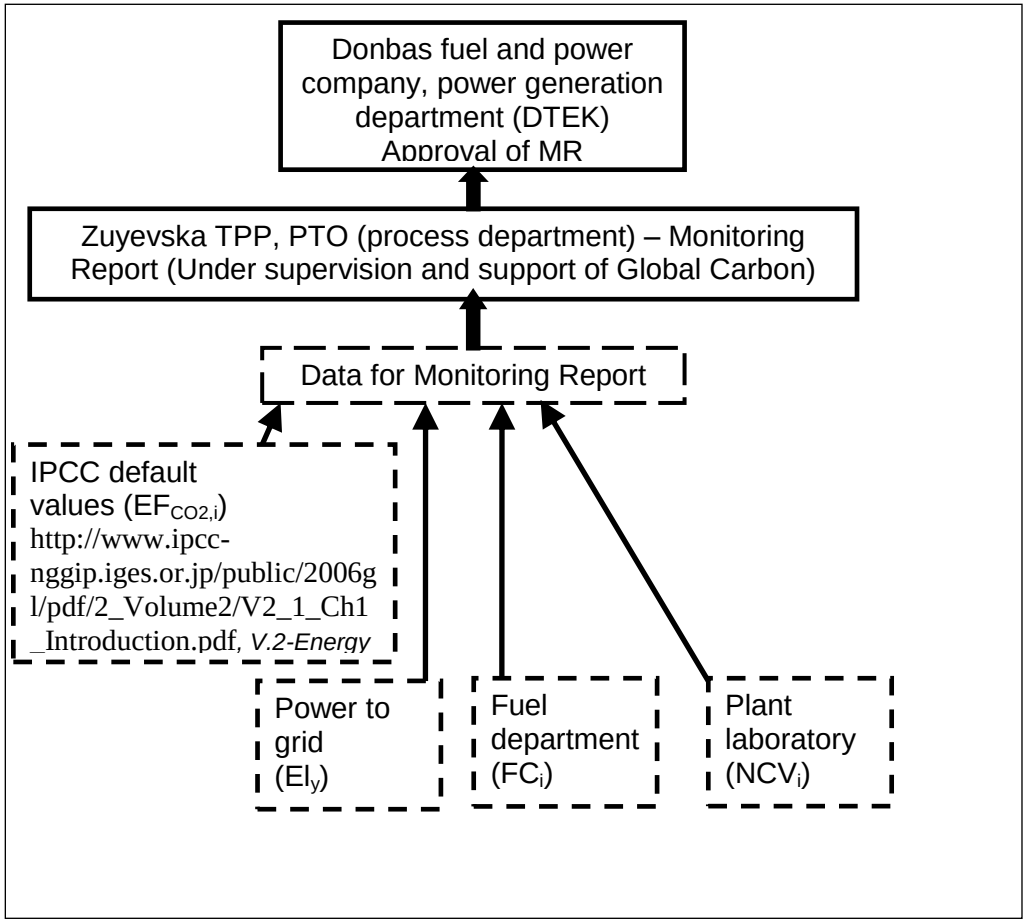

Figure 2: Data collection and processing for monitoring at Zuyevska TPP

B.4. Special event log:

- All special events will be recorded in the shift-charge engineers's log book

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The are no any special events during the monitored period.

SECTION C. Quality assurance and quality control measures

C.1. Documented procedures and management plan:

C.1.1. Roles and responsibilities:

The general project management will be implemented by Mr. Vladimir Zhelezniak, head of process department of Zuyevska TPP through supervising and coordinating activities of his subordinates and other power plant divisions, head of accounting department, head of plant laboratory, fuel department. The process department is responcible for routine preparation and keeping the power plant performance forms, which record amount of power produced and exporthed to grid, fuel consumed, runhours of all major equipment, specific fuel consumption, NCV of fuels, actual and planned performance and ambient conditions. Within this responcibility the process departments interacts with plant divisions in getting necessary performance data.
The plant laboratory is responcible for measurement of NCV of fuels used.
The fuel department is responcible for monitoring and recording the fuel consumption data, transferring it to the process department.

C.1.2. Trainings:

The management of the personnel training and retraining at TPP is carried out by the Technical Director, and the control of implementation thereof − by the Head of the enterprise.
Depending on the category of the personnel, the following methods are applied:

- Checking the knowledge of the regulations, norms and instructions related to process, labor protection, industrial and fire safety;
- On-going training and retraining.

The activity with the personnel is organized and carried out in accordance with the plans approved by the Chief Engineer of the plant that include the following:

- Entry training;
- Personnel training in second and allied professions;

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- Re-training;
- Organizing the activity of the technical libraries, technical materials rooms and simulator training facilities.

Personnel involved in monitoring process will be trained and instructed according to the MP.

C.2. Involvement of Third Parties:

The calibration of all metering equipment and accreditation of the TPP laboratory is done by Ukrainian Centre for Standardization and Metrology and State Donetsk regional centre for standartisation, metrology and certification (SE “Donetskstandartmetrology”)

C.3. Internal audits and control measures:

All metering equipment is controlled by the Instrument department. It makes periodical checking and calibration of metering equipment as per approved schedule and equipment manual.

C.4. Troubleshooting procedures:

The troubleshooting is made by maintenance mechanics or on-duty electrician/operator. The internal system requires that a broken meter has to be replaced in few hours by the Instrument department.
The Chief of Instrument dpt (CTAI), M-r Alexander Zakharov is in charge with the above activities.
The troubleshooting procedures concerning the commercial electric meters which are property of the electricity distributing company are according to the national standards for that kind of equipment, i.e. in max. 5 days the distributing company has to replace the meter. During that period the data is taken on a historical basis for a similar period of time.

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SECTION D. Calculation of GHG emission reductions

D.1. Table providing the formulas used:

D.1.1. Formulas used to calculate project emissions:

$$PE_y = PE_{Fuel,y} \quad \textbf{(1)}$$

Where:

PE_y Project emission in year y (tCO_2)

$PE_{Fuel,y}$ Project emission due to combustion of fossil fuels in the boilers of TPP in year y (tCO_2)

$$PE_{Fuel,y} = \sum_i \left(FC_{i,y} \times EF_{CO2,i} \times NCV_{i,y} \right) \times 0.004187 \quad \textbf{(2)}$$

Where:

$FC_{i,y}$ = the fuel of type *i* consumed during year y (tonnes or thousand Nm^3)

$EF_{CO2,i}$ = fuel of type *i* Emission Factor (tCO_2/GJ)

$NCV_{i,y}$ = the net calorific value of fuel of type i in year y (kcal/kg or per Nm^3)

i = 1 (coal); 2 (gas); 3 (mazut)

0.004187 = conversion factor from kcal/kg (or kcal/Nm^3) into GJ/t (or GJ/1000 Nm^3)

D.1.2. Formulas used to calculate baseline emissions:

$$BE_y = BE_{Fuel,y} \quad \textbf{(3)}$$

Where:

BE_y is the baseline emissions for the year y (tCO_2)

$BE_{Fuel,y}$ is the baseline CO_2 emissions due to combustion of fossil fuels in the boilers of TPP (tCO_2)

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$$BE_{Fuel,y} = \sum_i \frac{0.0293076 \times SFC_{Bsl} \times EL_y \times FC_{i,y} \times NCV_{i,y} \times EF_{CO_2 i,y}}{\sum_i \left(FC_{i,y} \times NCV_{i,y} \right)} \quad \textbf{(4)}$$

Where:

SFC_{Bsl}	= the baseline specific fuel consumption for supply of power to the grid (plant heat rate) (g.c.e/kWh)
$FC_{i,y}$	= the fuel of type i (coal, natural gas and heavy fuel oil (mazut)) consumption during the year y (tons)
$EF_{CO2,I,y}$	= the carbon emission factor of fuel of type i during the year y (tCO_2/GJ)
$NCV_{i,y}$	= the net (lower) calorific value of fuel of type i during the year y (kcal/kg or per Nm^3)
EL_y	= the annual amount of electricity supplied by TPP to the grid in year y (MWh)
i	= 1 (coal); 2 (gas); 3 (mazut)
0.0293076	= conversion factor from g.c.e./kWh into GJ/MWh

The baseline specific fuel consumption **SFC_{Bsl}** is fixed in PDD as annual average of the most recent seven years preceding the project start (2002 to 2008).

$$SFC_{Bsl} = \sum_y SFC_y \times \frac{1}{7} \quad \textbf{(5)}$$

Where:

SFC_y	= the specific fuel consumption of the TPP in year y for producing electricity and heat (GJ/MWh)
SFC_{BSL}	= the baseline fuel consumption of the TPP for producing electricity and heat (GJ/MWh)
EL_y	= the power supplied by TPP to the grid in year y (MWh)
y	= the year from 2002 to 2008

As set in PDD the **SFC_{BSL}= 359.059 g.c.e./kWh**

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D.1.3. Formulas used to calculate emission reductions:

$$ER_y = BE_y - PE_y \quad (7)$$

Where:
ER_y = emission reduction of the JI project in year y (tCO_2e)
BE_y = the baseline emissions in year y (tCO_2e)
PE_y = the project emissions in year y (tCO_2e)

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

All measurement uncertainties and error propagation are according to the passports of measuring equipment and the calibration certificates.

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

D.3.1. Project emissions:

Monitoring period [month]		01.2010- 12.2010	01.2011	02.2011
Project emissions (PE)	[tCO2e]	5 349 365	521 883	564 658
Total	[tCO2e]	**6 435 906**		

D.3.2. Baseline emissions:

Monitoring period [month]		01.2010- 12.2010	01.2011	02.2011
Baseline emissions (BE)	[tCO2e]	5 492 751	542 587	590 337
Total	[tCO2e]	**6 625 675**		

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D.3.3. Leakage:

N.A.

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

Monitoring period [month]		01.2010- 12.2010	01.2011	02.2011
Emission reductions (ER)	[tCO2e]	143 386	20 704	25 679
Total	[tCO2e]	**189 769**		

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Annex 1

Definitions and acronyms

Acronyms and Abbreviations

ERU	EMISSION REDUCTION UNITS
CO_2	CARBON DIOXIDE
GHG	GREENHOUSE GASES
GJ	GIGAJOULE
IPCC	INTERGOVERMENTAL PANEL ON CLIMATE CHANGE
MWH	MEGAWAT HOUR
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 (CO2), Methane (CH4), Nitrous Oxide (N2O), Hydrofluorcarbons (HFCs), Perfluorcarbons (PFCs) and Sulphurhexafluoride (SF6).

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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).

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