THIRD PERIODIC MONITORING REPORT

CONTENTS

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SECTION A. General project activity and monitoring information.

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A.1 Title of the project activity:

"Reconstruction of Units1, 2, 3 and 4 at Zuyevska Thermal Power Plant"
Date: 28 March 2012.

Version: 2.4.

A.2. JI registration number:

JI Ref #: 0198
ITL ID: UA2000028

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 (thermal power plant), which belongs to the DTEK holding company, Ukraine. The TPP has four conventional condensing steam turbine units of 325 MW (Unit #1), 315 MW (Unit #2) and 300 MW (Unit #3, #4)
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 consisted of the following packages of individual measures:

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1. Modernisation of steam turbine generator (STG), including:
    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 10.040 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 reconstruction of Unit #1 included:

- Modernization of boiler TPP-312A
- Modernization of the turbine K-300-240-2
- Modernization of alternator TGV-300-2UZ
- Modernization of electrostatic precipitators

The reconstruction of Unit #2 included:

- Modernization of boiler TPP-312A
- Modernization of the turbine K-300-240-2
- Modernization of alternator TGV-300-2UZ
- Modernization of electrostatic precipitators

The project has received the following letters of approval:

- Letter of approval by National Environmental Investment Agency, 19 August 2010, #1231/23/7;
- Letter of approval by SenterNovem Netherlands, 7 January 2010, #2009JI22.

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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.

The plant is located in Zugres village, 60-letiya Oktyabrya street 100, Donetsk region, 86784. Coordinates: +48° 1' 4.19", +38° 17' 16.13".

A.4. Monitoring period:

- Monitoring period starting date: 01/03/2011
- Monitoring period closing date: 31/12//2011

Both days are included into the monitoring period.

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

A.5.1. Baseline methodology:

A JI (Joint Implementation) specific approach regarding baseline setting and monitoring has been developed in accordance with Appendix B of the JI Guidelines. 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

[1] JI guidelines, appendix B

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scenarios are identified and listed on the basis of conservative assumptions. 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.

A.5.2. Monitoring methodology:

The JI specific approach has been used for the purpose of the monitoring. This approach foresees monitoring of:

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

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

Assumptions:

- The technical lifetime of the existing equipment will last at least to 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 are the IPCC default data.
- 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:

During the third monitoring period two reconstructed Zuyevska TPP units were being in operation - #1 and #2. Changes after the reconstruction of Units #1 and #2 are reflected in the table below:

	Unit #1	Unit #2
Planned start of operation after reconstruction	12/2009	12/2008
Actual start of operation after reconstruction	08/2011	04/2009
Installed capacity before the reconsctruction	300 MW	300 MW
Installed capacity after the reconstruction	325 MW	315 MW

Table 1: Schedule of reconstruction and installed capacity changes of modernised units.

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The marking of the reconstructed equipment has been changed respectively.

After the reconstruction of Unit #2 concentration of ashes in smoke gases decreased from 0.4 to 0.18 g/m^3 . As a result of modernization, capacity of turbine K-300-240-2 changed from 300 MW to 315 MW; of alternator TGV-300-2UZ - from 300 MW to 315 MW. This had substantively risen the effectiveness of Unit #2 energy generation.

The reconstruction of Unit #1 increased capacity of generator and turbine from 300 MW to 325 MW. The regular operation of Unit#1 began in the third quarter of 2011.

Reconstruction of Unit #4 started in March 2012. Schedule of units start after modernisation is planned below:

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

Table 2: Planned units reconstruction schedule.

After completion of the last unit the project will operate at full scale.

During the monitoring period several planned repairs took place. Delivery of repair parts for Unit #1 was delayed and runner of Unit #3 turbine needed non-scheduled maintenance. The dates of periodic repairs were changed according to the table below

Unit #	Repair type	Actual repair start	Actual repair end
1	Regular	12/04/2011	11/05/2011
2	Mid	26/07/2011	09/10/2011
3	Mid	18/05/2011	25/07/2011
4	Mid	10/10/2011	02/11/2011

Table 3: Repair plan.

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

The value of emission reductions in the PDD (Project Design Documents) expected for 2011 is higher then ER (Emission Reductions) stated in the MR (Monitoring Report). The discrepancy in baseline emissions can be explained by the repairs of Unit #2 held in August-September 2011 and repairs of Unit #3 held in May, so less electricity was produced during the monitoring period. ER in the PDD were evaluated based on forecasts, so slight difference between expected and achieved ER values is acceptable. In the following table ER in MR and PDD are compared for the 10 months' period.

	PDD	MR	Data unit
ER	227 077/12×10 = 189 231	126 649	tCO_2e

Table 5: Expected and actual monitoring values.

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

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Actual conversion factor from kcal/kg (or kcal/m^3) into GJ/t (or GJ/1000 m^3) differs from the one in the previous monitoring report for the respective period stated in A.4. as shown in a table 2 below:

Source	Conversion factor value
MR #1, #2	0.004187
MR #3	0.0041868

Table 4: Conversion factor values in monitoring reports.

Conversion factor differs, because it is rounded in the text of second MR, but not in the calculating model. Calculations were made using conversion factor, stated in current MR. The amendment does not influence the amount of emission reduction. The corrected conversion factor is used in the formulas of the MR

A.9. Changes since last verification:

No changes.

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

Zuyevska TPP

- Yevgen Zheleznyak, head of process department (PTO), DTEK;
- Aleksey Mikhailov, leading specialist, department of environmental safety.

Global Carbon B.V.

- Denis Prusakov, Team Leader JI Consultants;
- Olga Monchak, JI Consultant.

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SECTION B. Key monitoring activities

The project activity only affects the emissions due to combustion of fuels in the boilers of plant 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 amounts 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 to the methodological guidelines GKD 34.09.103-96) is prepared on mothly and yearly basis. The form contains amounts of electricity generated by each unit, electricity consumed by plant/unit auxiliaries, electricity 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.

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

B.1. Monitoring equipment:

Annual amount of electricity supplied by TPP to the grid in period y

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

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

The amount of electricity 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.. Each meter has a back up meter installed of same accuracy.

Separately, the amount of electricity consumed by back-up excitation system is measured by individual meter.

Amount of electricity supplied by TPP to the grid EL_y is obtained by substraction of electricity used to feed auxiliaries (including the back-up excitation) from the amount of electricity 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

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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 LK-2A and LK-2B 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 natural gas

Consumption of natural gas is metered by flow meter Flowtek-2 installed at gas pressure reducing station owned by gas suppliers. This meter is certified as commercial metering device used for billing the power plant for gas consumed. Data is recorded and stored and constantly reported to the TPP. For the purposes of collecting monitoring data reports of the gas supllying company are used.

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 is recorded and transferred from fuel department to process department where has been stored and also used for daily control.

Net calorific value (NCV) of fuel type *i* during period y

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

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

ID[2]	**Equipment, location**		**Manufacturer/ type**	**Serial number**	**Unit**	**Installation date**	**Accuracy class**	**Last calibration date**	**Next calibration date**	**Comments**
	Electricity generation									
$EM1_{new}$	Electricity meter, Unit #1 alternator, 20kV	main	Actaris SL7000	53101785	kWh	3Q2011	0.2s	1Q2011	1Q2017	
$EM2_{new}$		backup	Actaris SL7000	53105802	kWh	2Q2011	0.2s	1Q2011	1Q2017	
$EM1_{old}$	Replaced electricity meters, Unit #1 alternator, 20kV	main	EA02RAL-C-4	01147041	kWh	2Q2011	0.2s	4Q2006	N/A	Replaced 17/08/2011
$EM2_{old}$		backup	STK3-02	36105	kWh	-	0.2s	4Q2006	N/A	Replaced 9/06/2011
$EM3_{new}$	Electricity meter, Unit #2 alternator, 20kV	main	Actaris SL7000	53101788	kWh	3Q2011	0.2s	1Q2011	1Q2017	
$EM4_{new}$		backup	Actaris SL7000	53105786	kWh	2Q2011	0.2s	1Q2011	1Q2017	
$EM3_{old}$	Replaced electricity meters, Unit #2 alternator, 20kV	main	EA02RAL-C-4	01147080	kWh	2Q2011	0.2s	4Q2006	N/A	Replaced 16/08/2011
$EM4_{old}$		backup	STK3-02	36106	kWh	-	0.2s	4Q2006	N/A	Replaced 9/06/2011
$EM5_{new}$	Electricity meter, Unit #3 alternator, 20kV	main	Actaris SL7000	53101793	kWh	3Q2011	0.2s	1Q2011	1Q2017	
$EM6_{new}$		backup	Actaris SL7000	53105775	kWh	2Q2011	0.2s	1Q2011	1Q2017	
$EM5_{old}$	Replaced electricity meters, Unit #3 alternator, 20kV	main	EA02RAL-C-4	01147064	kWh	2Q2011	0.2s	4Q2006	N/A	Replaced 17/08/2011
$EM6_{old}$		backup	STK3-02	36104	kWh	-	0.2s	4Q2006	N/A	Replaced 9/06/2011

[2] Electricity meters (EM) with index *old* were reblaced with EM with index *new* respectively.

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$EM7_{new}$	Electricity meter, Unit #4 alternator, 20kV	main	Actaris SL7000	53101791	kWh	3Q2011	0.2s	1Q2011	1Q2017	
$EM8_{new}$		backup	Actaris SL7000	53105769	kWh	2Q2011	0.2s	1Q2011	1Q2017	
$EM7_{old}$	Replaced electricity meters, Unit #4 alternator, 20kV	main	EA02RAL-C-4	01147039	kWh	2Q2011	0.2s	4Q2006	N/A	Replaced 19/08/2011
$EM8_{old}$		backup	STK3-02	36100	kWh	-	0.2s	4Q2006	N/A	Replaced 9/06/2011
	Electricity consumption for reserve excitation of alternators									
$EM9_{new}$	Electricity meter, 6 kV Section 1-A	main	Actaris SL7000	53112339	kWh	3Q2011	0.5s	1Q2011	1Q2017	
$EM9_{old}$	Replaced electricity meter, 6 kV Section 1-A	main	EA05RL-C-3	01147108	kWh	-	0.5s	4Q2006	N/A	Replaced 19/08/2011
	Electricity consumption for power plant auxiliaries									
$EM10_{new}$	Electricity meter, TR 21 Sect A	main	Actaris SL7000	53112337	kWh	3Q2011	0.5s	1Q2011	1Q2017	
$EM11_{new}$		backup	Actaris SL7000	53101017	kWh	2Q2011	0.5s	1Q2011	1Q2017	
$EM10_{old}$	Replaced electricity meters, TR 21 Sect A	main	EA05RL-C-3	01147105	kWh	2Q2011	0.5s	4Q2006	N/A	Replaced 17/08/2011
$EM11_{old}$		backup	CE6805V	02825501534	kWh	-	0.5s	4Q2006	N/A	Replaced8/06/2011
$EM12_{new}$	Electricity meter, TR 21 Sect B	main	Actaris SL7000	53112326	kWh	3Q2011	0.5s	1Q2011	1Q2017	
$EM13_{new}$		backup	Actaris SL7000	53112347	kWh	2Q2011	0.5s	1Q2011	1Q2017	
$EM12_{old}$	Replaced electricity meters, TR 21 Sect B	main	EA05RL-C-3	01147103	kWh	2Q2011	0.5s	4Q2006	N/A	Replaced 17/08/2011
$EM13_{old}$		backup	CE6805V	02825501533	kWh	-	0.5s	4Q2006	N/A	Replaced 8/06/2011
$EM14_{new}$	Electricity meter, Auxiliary TR 22 Sect A	main	Actaris SL7000	53112348	kWh	3Q2011	0.5s	1Q2011	1Q2017	

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$EM15_{new}$		backup	Actaris SL7000	53112338	kWh	2Q2011	0.5s	1Q2011	1Q2017	
$EM14_{old}$	Replaced electricity meters, Auxiliary TR 22 Sect A	main	EA05RL-C-3	01147094	kWh	2Q2011	0.5s	4Q2006	N/A	Replaced 16/08/2011
$EM15_{old}$		backup	CE6805V	020825501538	kWh	-	0.5s	4Q2006	N/A	Replaced 7/06/2011
$EM16_{new}$	Electricity meter, Auxiliary TR 22 Sect B	main	Actaris SL7000	53112327	kWh	3Q2011	0.5s	1Q2011	1Q2017	
$EM17_{new}$		backup	Actaris SL7000	53112349	kWh	2Q2011	0.5s	1Q2011	1Q2017	
$EM16_{old}$	Replaced electricity meters, Auxiliary TR 22 Sect B	main	EA05RLC3	01147104	kWh	2Q2011	0.5s	4Q2006	N/A	Replaced 16/08/2011
$EM17_{old}$		backup	CE6805V	02595500083	kWh	-	0.5s	4Q2006	N/A	Replaced 8/06/2011
$EM18_{new}$	Electricity meter, Auxiliary TR 23 Sect A	main	Actaris SL7000	53112348	kWh	3Q2011	0.5s	1Q2011	1Q2017	
$EM19_{new}$		backup	Actaris SL7000	53101027	kWh	2Q2011	0.5s	1Q2011	1Q2017	
$EM18_{old}$	Removed electricity meters, Auxiliary TR 23 Sect A	main	EA05RL-C-3	01147096	kWh	2Q2011	0.5s	4Q2011	N/A	Replaced 18/08/2011
$EM19_{old}$		backup	CE6805V	45012903	kWh	-	0.5s	4Q2006	N/A	Replaced 7/06/2011
$EM20_{new}$	Electricity meter, Auxiliary TR 23 Sect B	main	Actaris SL7000	53112350	kWh	3Q2011	0.5s	1Q2011	1Q2017	
$EM21_{new}$		backup	Actaris SL7000	53101022	kWh	2Q2011	0.5s	1Q2011	1Q2017	
$EM20_{old}$	Replaced electricity meters, Auxiliary TR 23 Sect B	main	EA05RL-C-3	01147095	kWh	2Q2011	0.5s	4Q2006	N/A	Replaced 18/08/2011
$EM21_{old}$		backup	CE6805V	02595500064	kWh	-	0.5s	4Q2006	N/A	Replaced 7/06/2011
$EM22_{new}$	Electricity meter, Auxiliary TR 24 Sect A	main	Actaris SL7000	53112336	kWh	3Q2011	0.5s	1Q2011	1Q2017	
$EM23_{new}$		backup	Actaris SL7000	53101037	kWh	2Q2011	0.5s	1Q2011	1Q2017	
$EM22_{old}$	Replaced electricity meters, Auxiliary TR 24 Sect A	main	EA05RL-C-3	01147097	kWh	2Q2011	0.5s	4Q2006	N/A	Replaced 18/08/2011

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$EM23_{old}$		backup	CE6805V	45066514	kWh	-	0.5s	4Q2006	N/A	Replaced 8/06/2011
$EM24_{new}$	Electricity meter, Auxiliary TR 24 Sect B	main	Actaris SL7000	53112340	kWh	3Q2011	0.5s	1Q2011	1Q2017	
$EM25_{new}$		backup	Actaris SL7000	53101057	kWh	2Q2011	0.5s	1Q2011	1Q2017	
$EM24_{old}$	Replaced electricity meters, Auxiliary TR 24 Sect B	main	EA05RL-C-3	01147106	kWh	2Q2011	0.5s	1Q2011	N/A	Replaced 18/08/2011
$EM25_{old}$		backup	CE6805V	45069325	kWh	-	0.5s	4Q2006	N/A	Replaced 8/06/2011
$EM26_{new}$	Electricity meter on consumption of PE "Adamant-Ya"		NIK2303APK1T	0119034	kWh	4Q2011	2.0	4Q2011	4Q2028	
$EM26_{old}$	Replaced electricity meter consumption of PE "Adamant-Ya"		STK-3-10	36102	kWh	-	1.0	4Q2006	N/A	Replaced 13/12/2011
$EM27_{new}$	Electricity meter on consumption of ZEMP measuring device		NIK2104-02 200	3723772	kWh	4Q2011	1.0	4Q2011	4Q2028	
$EM27_{old}$	Replaced electricity meter		STK-1-10	83226	kWh	-	1.0	2006	N/A	Replaced 29/12/2011

Table 6: Electricity meters.

Coal weigthing.

Equipment	Meter abbreviation	Manufacturer/ type	Serial number	Unit	Accuracy	Last calibration	Next calibration
Coal conveyor strain scales at conveyor LK-2A	MC#1	MICA, "ErMak VL 2-2"	1757	t	± 0.5 %	26/10/2011	26/04/2012
Coal conveyor strain scales at conveyor LK-2B	MC#2	MICA, "ErMak VL 2-2"	1803	t	± 0.5 %	26/10/2011	26/04/2012

Table 7: 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 for SL7000 meters is 6 years. Calibration interval for EA05-RL-C3 meters is 8 years Calibration interval for NIK2303APK1T and NIK2104-02 is 16 years	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine

For Natural Gas Flow Meters:

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of such meters is 2 years.	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine

The Natural Gas Flow Meters are installed at the supplier side. Gas supply company is responsible for calibration and verification of the meters. For the pruposes of the monitoring data of the gas supply company are used.

For scales:

QA/QC procedures	Body responsible for calibration and certification
Calibration interval of such meters is 1 year.	Calibration will be performed by the authorized representatives of the State Metrological System of Ukraine

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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	Comment
$EF_{CO2,1}$, Sub-bituminous coal emission factor for combustion	Default CO_2 emission factor for natural gas from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 1, Introduction, Table 1.4	tCO_2/GJ	0.0961	In the 2006 IPCC Guidelines emission factors are provided in measurement units of kg of greenhouse gas per TJ on a Net Calorific Basis. The value of the emission factor has been converted from these units to tCO_2/GJ for the purposes of this monitoring report.
$EF_{CO2,2}$, Natural gas emission factor for combustion	Default CO_2 emission factor for natural gas from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 1, Introduction, Table 1.4	tCO_2/GJ	0.0561	
$EF_{CO2,3}$ Heavy oil (mazut) emission factor for combustion	Default CO_2 emission factor for natural gas from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 1, Introduction, Table 1.4	tCO_2/GJ	0.0774	
SFC_{Bsl}, Baseline specific overal (for producing electricity and heat) fuel consumptionf or supply of electricity to the grid (station heat rate)	Fixed ex-ante in the PDD	GJ/MWh	10.5232 (359.059 g.c.e./k Wh)[3]	

Table 8: Project fixed default values.

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

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B.2.2. List of variables:

Data variable	Data unit	Method of calculation
EL_y, Annual amount of electricity supplied by TPP to the grid in period y	MWh	Measurement by electricity meters, calculation
$FC_{i,y}$, Fuel of type *i* consumed during period y for producing electricity and heat	t or thousands m^3	-
$NCV_{i,y}$, Net calorific value of fuel type *i* during period y	GJ/t or per thousand m^3	TPP laboratory measurements

Table 9:List of variables.

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

Period:			03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	11/2011	12/2011
FC_1	Coal consumption	t	336 880	286 747	220 840	242 481	264 635	274 783	203 545	229 719	297 569	317 314
FC_2	Natural gas consumption	thous.[4]m^3	1 791	1 072	3 205	1 829	1 674	2 010	1 201	2 010	1 710	2 398
FC_3	Mazut consumption	t	0	0	0	0	0	13.74	0	0	0	0
NCV_1	Net calorific value of coal	kcal/kg	4 711	4 678	4 607	4 624	4 582	4 524	4 787	4 667	4 609	4 640
NCV_2	Net calorific value of natural gas	kcal/m^3	8 048	8 819	8 139	8 686	8 073	8 154	8 192	8 122	8 102	8 088
NCV_3	Net calorific value of mazut	kcal/kg	8 819	8 031	8 933	8 114	8 879	9 178	9 194	9 171	8 893	8 471
$EF_{CO2,1}$	Sub-bituminous coal emission factor for combustion	tCO_2/GJ	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961
$EF_{CO2,2}$	Natural gas emission factor for combustion	tCO_2/GJ	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561
$EF_{CO2,3}$	Heavy oil (mazut) emission factor for combustion	tCO_2/GJ	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774

Table 10: Data collected in project scenario.

[4] m^3 of natural gas is provided at following conditions: t = 20°C, P = 101325 Pa

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

Period:			03/2011	04/2011	05/2011	06/2011	07/2011	08/2011	09/2011	10/2011	11/2011	12/2011
NCV_1	Net calorific value of coal	kcal/kg	4 711	4 678	4 607	4 624	4 582	4 524	4 787	4 667	4 609	4 640
NCV_2	Net calorific value of natural gasG	kcal/ m^3	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561
NCV_3	Net calorific value of mazut	kcal/kg	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774
$EF_{CO2,1}$	Sub-bituminous coal emission factor for combustion	tCO_2/GJ	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961	0.0961
$EF_{CO2,2}$	Natural gas emission factor for combustion	tCO_2/GJ	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561	0.0561
$EF_{CO2,3}$	Heavy oil (mazut) emission factor for combustion	tCO_2/GJ	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774	0.0774
SFC_{Bsl}[5]	Fixed baseline specific overal (for producing electricity and heat) fuel consumption for supply of electricity to the grid (station heat rate)	GJ/MWh	10.5232	10.5232	10.5232	10.5232	10.5232	10.5232	10.5232	10.5232	10.5232	10.5232
EL_y	Amount of electricity supplied to grid	MWh	668610	556217	423988	460216	485616	501037	398187	437806	575191	620942

Table 11: Data collected for the baseline

[5] In the standard 3-TEH form data is provided in measurement units of g.c.e/kWh. The values has been converted from these units to GJ/MWh for the purposes of this monitoring report.

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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 14.07.2011, № 2707-XII.

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 license (allowance). The environmental reporting and conformance to applicable norms in force is regularly checked by State environmental inspection in Donetsk Region.

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, who carry out monitoring and reporting);
- 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, what is stated in the Order #202 of "Skhidenergo" LLC - "On information archiving" from 09/09/2010.

Person responsible for data collection and archiving is Mr. Yevgeniy Zhelesnyak – head of process department of Zuyevskaya TPP.

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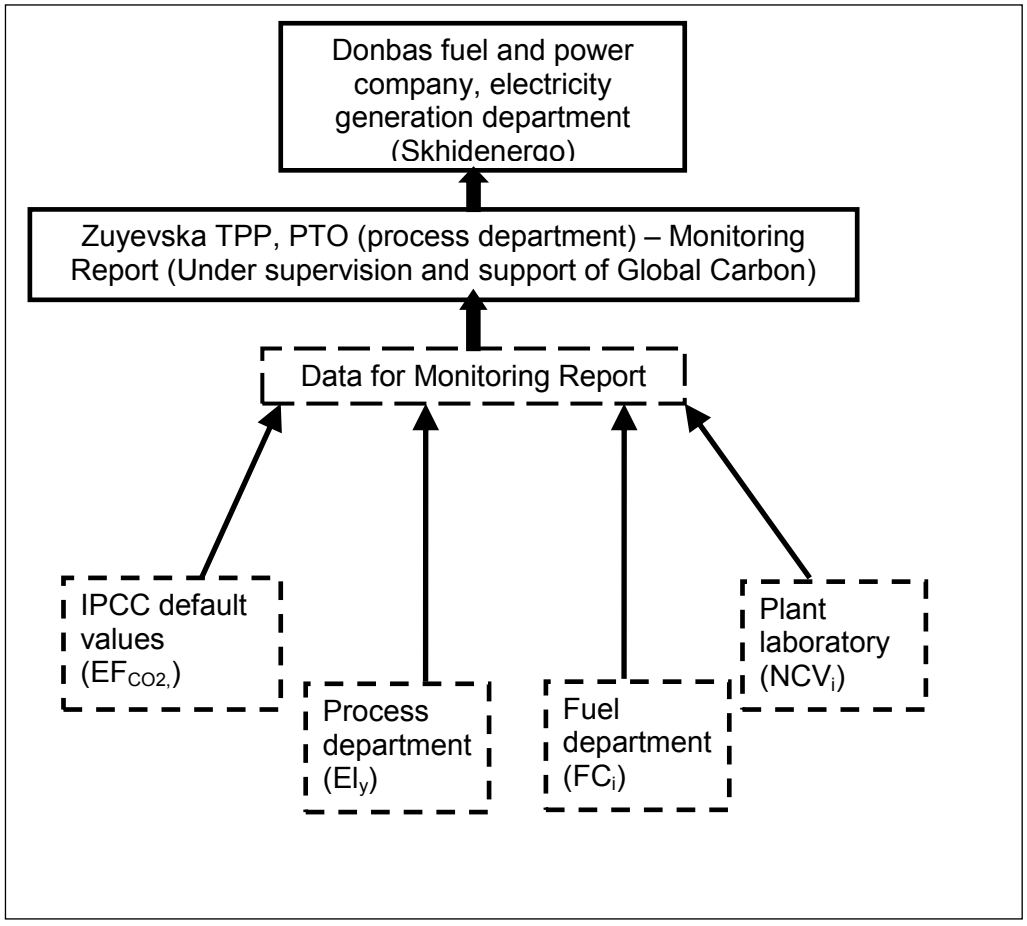

Figure 2: Data collection and processing for monitoring at Zuyevska TPP.

B.4. Special event log:

All special events will be recorded in the shift-charge engineers's log book**.** There were no special events during the monitored period.

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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. Yevgen 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 responsible for routine preparation and keeping the power plant performance forms, which record amount of electricity produced and exported to the grid, fuel consumed, runhours of all major equipment, specific fuel consumption, NCV of fuels, actual and planned performance and ambient conditions. Within this responsibility the process departments interacts with plant divisions in getting necessary performance data.

The plant laboratory is responsible for measurement of NCV of coal and heavy oil used. The fuel department is responsible 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;
- 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 “Donetskstandartmetrologiya”).

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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 a broken meter to be replaced in few hours by the Instrument department.

The Chief of Instrument Department, Mr. Alexander Zakharov, is in charge with the abovementioned 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 period y (tCO_2e)

$PE_{Fuel,y}$ - Project emission due to combustion of fossil fuels in the boilers of TPP in period y (tCO_2e)

$$PE_{Fuel,y} = \sum_i (FC_{i,y} \times EF_{CO2,i} \times NCV_{i,y}) \times 0.0041868 \quad \textbf{(2)}$$

Where:

$FC_{i,y}$ - fuel of type *i* consumed during period y (t or thousand m^3)
$EF_{CO2,i}$ - fuel of type *i* Emission Factor (tCO_2/GJ)
$NCV_{i,y}$ - net calorific value of fuel of type i in period y (kcal/kg or per m^3)
i - 1 (coal); 2 (gas); 3 (mazut)
0.0041868 - conversion factor from kcal/kg (or kcal/m^3) into GJ/t (or GJ/1000 m^3)

D.1.2. Formulas used to calculate baseline emissions:

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

Where:

BE_y - baseline emissions for the period y (tCO_2e)
$BE_{Fuel,y}$ - baseline CO_2 emissions due to combustion of fossil fuels in the boilers of TPP (tCO_2e)

$$BE_{Fuel,y} = \sum_i \frac{0.0293076 \times SFC_{Bsl} \times El_y \times FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_i (FC_{i,y} \times NCV_{i,y})} \quad \textbf{(4)}$$

Where:

SFC_{Bsl} - baseline specific fuel consumption for supply of electricity to the grid (plant heat rate) (g.c.e/kWh)
$FC_{i,y}$ - fuel of type i (coal, natural gas and heavy fuel oil (mazut)) consumption during the period y (t or thousands m^3)

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$EF_{CO2,i,y}$ - carbon emission factor of fuel of type i during the period y (tCO_2/GJ)
$NCV_{i,y}$ - net (lower) calorific value of fuel of type i during the period y (kcal/kg or per m^3)
EL_y - annual amount of electricity supplied by TPP to the grid in period 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 - specific fuel consumption of the TPP in period y for producing electricity and heat (GJ/MWh)

SFC_{BSL} - baseline fuel consumption of the TPP for producing electricity and heat (GJ/MWh)

EL_y - electricity supplied by TPP to the grid in period y (MWh)

y - year from 2002 to 2008

As it is set in the PDD,

SFC_{BSL} = 359.059 g.c.e./kWh

D.1.3. Formulas used to calculate emission reductions:

$$ER_y = BE_y - PE_y \quad \textbf{(6)}$$

Where:

ER_y - emission reduction of the JI project in period y (tCO_2e)
BE_y - baseline emissions in period y (tCO_2e)
PE_y - project emissions in period 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.

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

D.3.1. Project emissions:

Parameter	*Monitoring Period*	*Unit*	*Value*
Project Emissions	03/2011-12/2011	tCO_2e	5 030 653

D.3.2. Baseline emissions:

Parameter	*Monitoring Period*	*Unit*	*Value*
Baseline Emissions	03/2011-12/2011	tCO_2e	5 157 302

D.3.3. Leakage:

N.A.

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

Parameter	*Monitoring Period*	*Unit*	*Value*
Emission Reduction	03/2011-12/2011	tCO_2e	**126 649**

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Annex 1

Definitions and acronyms.

ERU	EMISSION REDUCTION UNITS
ER	EMISSION REDUCTIONS
ESP	ELECTROSTATIC PRECIPITATOR
GHG	GREENHOUSE GASES
GJ	GIGAJOULE
IPCC	INTERGOVERMENTAL PANEL ON CLIMATE CHANGE
JI	JOINT IMPLEMENTATION
MR	MONITORING REPORT
MWH	MEGAWATT HOUR
NCV	NET CALORIFIC VALUE
PDD	PROJECT DESIGN DOCUMENT
PTO	PROCESS DEPARTMENT
STG	STEAM TURBINE GENERATOR
TPP	THERMAL POWER PLANT

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 (SF_6).
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 PDD

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