JOINT IMPLEMENTATION PROJECT MONITORING REPORT

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JI PROJECT MONITORING REPORT

Background and Objectives of the Monitoring Report

According to paragraph 36 of the JI guidelines project participants "shall submit to an accredited independent entity a report in accordance with the monitoring plan on reductions in anthropogenic emissions by sources or enhancements of anthropogenic removals by sinks that have already occurred. The report shall be made publicly available."

The objective of the present monitoring report is to provide the complete, consistent, clear, and accurate calculation of the emissions reductions, within the boundaries of the “Reconstruction of the units at the Structure Unit “Luhanskaya TPP” of the “Skhidenergo” ltd.” Joint Implementation Project, for the period 1st January 2010 – 31st March 2011.

JI PROJECT MONITORING REPORT

SECTION A. General description of the project activity

A.1. Title of the project:

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Title: Reconstruction of the units at the Structure Unit “Luhanskaya TPP” of the “Skhidenergo” ltd.

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

Version: 1.2-2010LuTPP-Eng

Date: 06.05.2011

A.2. JI registration number:

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UA 1000206

Letters of Approval:

- 752/23/07 issued by the National Environmental Investment Agency of Ukraine 09.06.2010;
- CFCarbonII/01/2010 issued by the UK Department of Energy and Climate Change 3.12.2010.

A.3. Short description of the Project Activity:

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According to the Project Schedule the Reconstruction of the Unit #10 started at the TPP and the preparation measures for the TPP Units’ Reconstructions were implemented during the monitoring period. These measures included:

Generating Unit № 9:

1) Capital repairs of the mill Sh-50 at the Unit #9.

2) The replacement of the outlet stair “ducks” at the 2-nd steamheater (Sh1;4).

3) The replacement of the fittings, heavy fuel oil safety valves, continious boiler blowing control unit, 100-E valves and the circuit drainage water economizer;

4) The repairs of the Raw Coal Bunker with the blinker replacement;

5) The repairs of the right horizontal gaspath with compensators. Repairs of the gas-air discharges and the boxes with the replacement of the defective parts;

6) The replacement of the screen overheater;

7) Repairs of the scrubbers' lining (cylindrical surface);

8) USI for the mikrodefects of the high- and mid- pressure cylinders' tubes;

9) The replacement of the high- and low- pressure tubes at the turbine department;

10) The factory repair of the 9A Electric Feed Pump;

11) The replacement of the heating section #5 ISV-350;

12) The repairs of the 9U Electric Feed Pump with the inner casing replacement;

13) The replacement of the oil pump of the Electric Feed Pump.

14) The replacement of the circulating water tubes of the turbine;

15) The replacement of the HPC electric motor;

16) The replacement of the electric motor of the servomotor;

17) The replacement of the freezer;

18) The replacement of the electric motor of the Dust Exhauster oil station;

19) The repairs of the main burners at the 1 – 4 shafts with the primary and tertiary air tubes replacement;

20) The VVN-220 KV contacts replacement;

21) Construction and replacement of the right horizontal gas-flow with the compensators;

22) The repairs of the Cold-Convector steam Superheater packages with the shell restoration;

Generating Unit № 10:

1) The hot overheating pipelines turns examination – 10 units; the examination of the High-Pressure Cylinder and the Mid-Pressure Cylinder tubes;

2) The production of the ## 1-5 scrubbers' housings and the metal frameworks;

3) The replacement of the circulating water pipelines (21,5 tons.);

4) The repairs of the High-Pressure Heater (3 units);

5) The steam pipelines cleaning 6020 dm^2.

Generating Unit № 11:

1) The major overhaul of the flow part of the Low-Pressure Cylinder at the DO-200-130 "LMZ" turbine with the replacement of the end and diaphragm seals and the Low-Pressure Rotor placement;

2) The major overhaul of the Sh-50 mill;

3) The inspection of the steam pipelines: live steam – 3 units; hot overheat – 8 units; flow pipelines of the High-Pressure Cylinder and the Mid-Pressure Cylinder – 4 units. Disassembling and the recovery of the thermal insulation;

4) The micro damages' inspection of the screen-type steam overheater flow tube turns. Disassembling and the recovery of the thermal insulation;

5) The trimming of the control groups of the turns at the non-heated zone. The trimming of the flow pipelines of the exhaust collector to the steam-taking camera. The trimming of the live steam and the hot overheating steam pipelines. Disassembling and the recovery of the thermal insulation;

6) The repairs of the Dust Exhauster #A,B outputs of the gas-air pipelines and boxes, high-pressure gas pipelines with the replacement of the defective parts. Disassembling and the recovery of the thermal insulation;

7) The replacement of the fittings, oil safety valves continious boiler blowing control unit, 100-E valves and the circuit drainage water economizer;

8) The repairs of the scrubbers' lining (cylindrical surface);

9) The factory repairs of the Vertical Condenser Pump;

10) The replacement of the generator water sealing;

11) The replacement of the turbogenerator bearing shells #4,5;

12) The replacement of the circulating water pipelines at the turbine;

13) The replacement of the electric motor VPV11A.

14) The repairs of the Dust Exhauster rotors;

15) The replacement of the MNU oil pump;

16) The replacement of the driving gear and the Ball Drum Mill;

17) The replacement of the boiler control valve;

18) The replacement of the Dust Exhausters outputs;

19) Disassembling and the recovery of the thermal insulation of the boiler equipment;

20) The replacement of the rotor parts;

Generating Unit № 13:

1) The major overhaul of the Sh-50 mill;

2) The replacement of the exhauster electric motors;

3) The micro damages' inspection of the screen-type steam overheater flow tube turns. Disassembling and the recovery of the thermal insulation;

4) The trimming of the control groups of the turns at the non-heated zone;

5) The replacement of the turns at the non-heated zone D108x11. Disassembling and the recovery of the thermal insulation;

6) The replacement of the fittings, heavy fuel oil safety valves, continious boiler blowing control unit, 100-E valves and the circuit drainage water economizer;

7) Technical diagnostic of the high-pressure heater 5,6,7 – cases and the pipeline part;

8) The repairs of the turbogenerator sealing scheme with the mounting of the three-way valve; pipelines' and stop valves replacement;

9) The replacement of the catch, accept High-Pressure heater Du -250;

10) The replacement of the turbine circulating water pipelines;

11) The replacement of the Raw Coal Bunker electric motor 1B,2B.

12) The replacement of the outlet stair "ducks" at the 2-nd steamheater of the shafts №1,2,3 of the TP-100 boiler;

13) The replacement of the 100-E catch;

14) The replacement of the Dust exhauster armor;

15) The repairs of the Clinker Removal System;

16) The replacement of the turbogenerator axial-flow fan blades (50 units);

17) The replacement of 2 electric motors on the regenerative air cooler A;

18) The replacement of the under-binding isolation at the turbogenerator rotor;

19) The replacement of the insulator at the connector of the block jack

Generating Unit № 14:

1) The major overhaul of the Sh-50 mill;

2) The replacement of the fittings, heavy fuel oil safety valves, continious boiler blowing control unit, 100-E valves and the circuit drainage water economizer;

3) Technical diagnostic of the A and B deaerators;

4) The replacement of the High-Pressure Heater feed water drainages;

5) The repairs of the PN-100 heating section with the tubes replacement;

6) The replacement of the in/out fittings' electric drives, accept High-Pressure Heater 5,6,7.

7) The replacement of the GPZ №1,2 electric drives;

8) The replacement of the turbogenerator drainages;

9) The replacement of the catch at the High-Pressure Heater -5 and High-Pressure Heater -4 Du-150;

10) The repairs of the 14A Electric Feed Pump;

11) The replacement of the bearing shells №1,2 with the recharge;

12) The replacement of the circulating water pipelines at the turbine;

13) The replacement of the 14TSN fan;

14) The replacement of the 14T fan;

15) The replacement of the turbine oil cooler (parts 63-90);

16) The replacement of the active energy meters;

Generating Unit № 15:

1) The major overhaul of the Sh-50 mill;

2) The replacement of the overhead steam overheater above the Sh№1-4 furnace;

3) The repairs of the cyclones and separators; The replacement of the live steam turns 325x38 (from the Unit №12) – 4 units;

4) The replacement of the fittings, heavy fuel oil safety valves, continious boiler blowing control unit, 100-E valves and the circuit drainage water economizer;

5) The replacement of the high- and low- pressure fittings at the turbine equipment;

6) The repairs of the Low-Pressure Cylinder with the low-pressure rotor inspection and repairs;

7) The replacement of the ISV №6 heating section;

8) The replacement of the bearing shells №3,5,6 with the recharge;

9) The repairs of the Low-Pressure Cylinder end seals with the ring segments replacement;

10) The replacement of the straight parts of the circulating water pipelines of the turbine;

11) The repairs of the DV rotor;

12) The replacement of the generator bushing;

13) The repairs of the thermal-mechanical equipment of the electric filters;

14) The replacement of the oil sealing at the flow part of the turbine;

15) The replacement of the VPV electric motor;

16) The replacement ROU-2 catch;

17) The replacement of the 4,984 tons of the screens;

18) The replacement of the end input of the generator;

19) The repairs of the cyclones and the dust separators;

As the result of the foregoing measures, the average Specific Fuel Rate of the energy supplied by the TPP lowered from **0.4379 tef/MWh (12.8305 GJ/MWh)** in the **Baseline Scenario** to **0.4262 tef/MWh (12.4877 GJ/MWh) in 2010**.

The Annual electricity supply in 2010 was **5 554 576 MWh**.

The electricity supply during 1.01 – 31.03.2011 was – **1 459 450** MWh.

Figure 1 Energy generating Unit №13 of the Luhanskaya TPP

A.4. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine	Skhidenergo Ltd.	No
Ukraine	ELTA JSC	No

A.5. Monitoring Period:

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Date of the Monitoring Period Start: 1.01.2010

Date of the Monitoring Period End: 31.03.2011.

A.6. Baseline and Monitoring Methodology applied:

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For the Project the own Approach was provided and determined by the AIE. The Approach in 2010 was approved by the National environmental investment agency of Ukraine as the Baseline and Monitoring Methodology "Methodology for Calculation and Monitoring of the Emissions due to the Rehabilitation and/or Energy Efficiency Improvement in Existing Thermal Power Plants".

Project uses a baseline and monitoring plan in accordance with "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 02.2)[1].

In the proposed project CO_2 emissions to atmosphere is reduced through the efficiency increase of power generation at the Luhanskaya TPP after the optimisation of the regimes, servicing, fuel preparations, reconstruction of the boiler, the turbine equipment, the control and regulation system, the electro-generation and the cooling system.

The energy production depends on the demand of the market. The station can increase the energy production at any time. It means that all the additional energy produced during the Project period substitutes the energy, which would have been produced by the TPP, but with the less efficiency and higher GHG emission.

The proposed Approach for the emission reductions' calculation uses the specific fuel rate (*SFRy*) parameter. This parameter shows the efficiency level of the fuel combustion at the TPP and, consequently, the emissions from the fuel combustion. This parameter is being calculated in the energy units (in tons of the equivalent fuel) and allows seeing the actual picture of the energy efficiency measures provided on the Station.

[1] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v2.2.pdf

For the purposes of the Baseline Emission and Emission Reductions calculation the value of the *SFRy* parameter was fixed on the 0.4389 tef/MWh (12.8305 GJ/MWh) – the average value for the 2003 – 2005. The Baseline Emission is calculated monthly and summarized at the end of the year for the whole lifetime of the Project, taking into account the annual electricity supply and the fuel mix in the specific year.

The Project Emission is also calculated monthly through the whole lifetime of the Project and being summarized at the end of the reporting period. The actual data of the calculated *SFRy* is used for these purposes.

For the Calculations the value of the Specific Fuel Rate (*SFR*) was used. This parameter is commonly used in energy sector and it shows the fuel (energy) consumption per the electric energy supplied to the grid.

The SFR parameter is calculated using the formula:

$$SFRy = \frac{\sum (Fiy * NCViy)}{7} / AELSy \qquad \textbf{(1)}$$

Where

SFRy – specific fuel rate of the power plant in year *y*, t.e.f./MWh. (GJ/MWh);

Fiy – the amount of the fuel *i* consumed by the power plant in year *y*, tons (th.m3);

NCViy – net caloric value of the fuel *i* in year *y*, Gcal/ton(th.m3);

7 - the net caloric value of one ton of the equivalent fuel, Gcal;

AELSy - annual energy supply of the power plant in year *y*, MWh.

All the data achieved in the calculations is being lowered by the uncertainties and accuracy level of the measuring equipment. (According to the GKD-34.09.103-96, approved by the Ministry of Energy and Electrification of Ukraine in 1996).

It is usually measured in the grams of the equivalent fuel per kW (tons per MW) of the energy supplied to the grid. One ton of the equivalent fuel (tef) is 29.3 GJ or 7 Gcal. The calculation of the *SFR* shows the fuel consumption irrelative of the type of the fuel. All the amount of the natural fuel is multiplied by the net caloric value of the fuel (specifically consumed) and these values are summed up. The use of the SFR parameter shows the real fuel efficiency of the TPP independent of the fuel quality and the net caloric value and allows comparing the fuel efficiency data of the different time periods.

A.7. Intended deviations or revisions to the determined PDD and Monitoring Plan:

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There are no deviations to the determined PDD and Monitoring Plan.

A.8. Changes since determination:

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There are some deviations in the values of the Baseline, Project Emissions and the Emission Reductions in the Monitoring Report in comparison with the determined PDD. For instance, the Emission Reductions for the 2010 at the PDD were determined at the level of 198 866 tons of the CO2 equivalent, but the Monitoring Report represents this value as 178 239 tons of the CO2 equivalent. These deviations exist because there were the average annual values of the Electricity Supply, Specific Fuel Rate and the Fuel mix used for the calculation of the PDD values. And in the Monitoring Report these calculations were made on the monthly data basis. The monthly calculations give more accurate values of the Baseline Emission, Project Emission and the Emission Reductions.

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

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Skhidenergo ltd.

- Zayets Oleksiy Viktorovich, Director for Economic and Finance

ELTA JSC

- Livshits Alexander Lazarevich, President

- Rogovoy Maksym Ivanovich, Deputy Director

SECTION B. Key Monitoring activities

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The project is implemented on the TPP in accordance with technical standards of Ukraine. All the equipment has monitoring and security equipment according to the national energy sector requirements. All the data, needed for the monitoring is collected in the production department of the TPP and accumulated in a specific standard table called “3-tech Form” in accordance with the GKD-34.09.103-96 “The calculation of the reported technical and economical parameters of the power plant concerning the thermal efficiency of the equipment. Methodological tool”, approved by the Ministry of Energy and Electrification of Ukraine in 1996. The main parameters of the Station are measured by the meters and shown in graphs in a real time. The data of the fuel consumption is measured and collected for the whole TPP and the energy produced is measured per each unit separately. This allows to measure the average emission for all the TPP and to see the influence of the Project activity while some of the units are out of operation.

All the starts and stops of each Unit are monitored and also shown in the technical documentation alongside with the working time hours for each Unit of the TPP.

That means, that even when some unit is out of the operation, all the measures continue to be collected and the overall project emission is still being calculated. All the calibrations and checks of the equipment are also documented.

The electricity supply is being monitored by the Electricity Department of the TPP at the central electric panel of the TPP and sent to the Technical Production Department (TPD).

The coal consumption is being monitored daily by the Fuel-Transport Department. The reports are also sent to the TPD.

The heavy fuel oil consumption is being monitored daily by the Boiler-Turbine Department of the TPP. The reports are sent to the TPD.

The natural gas consumption is being monitored by the Gas Distribution System. The daily reports are also sent to the TPD.

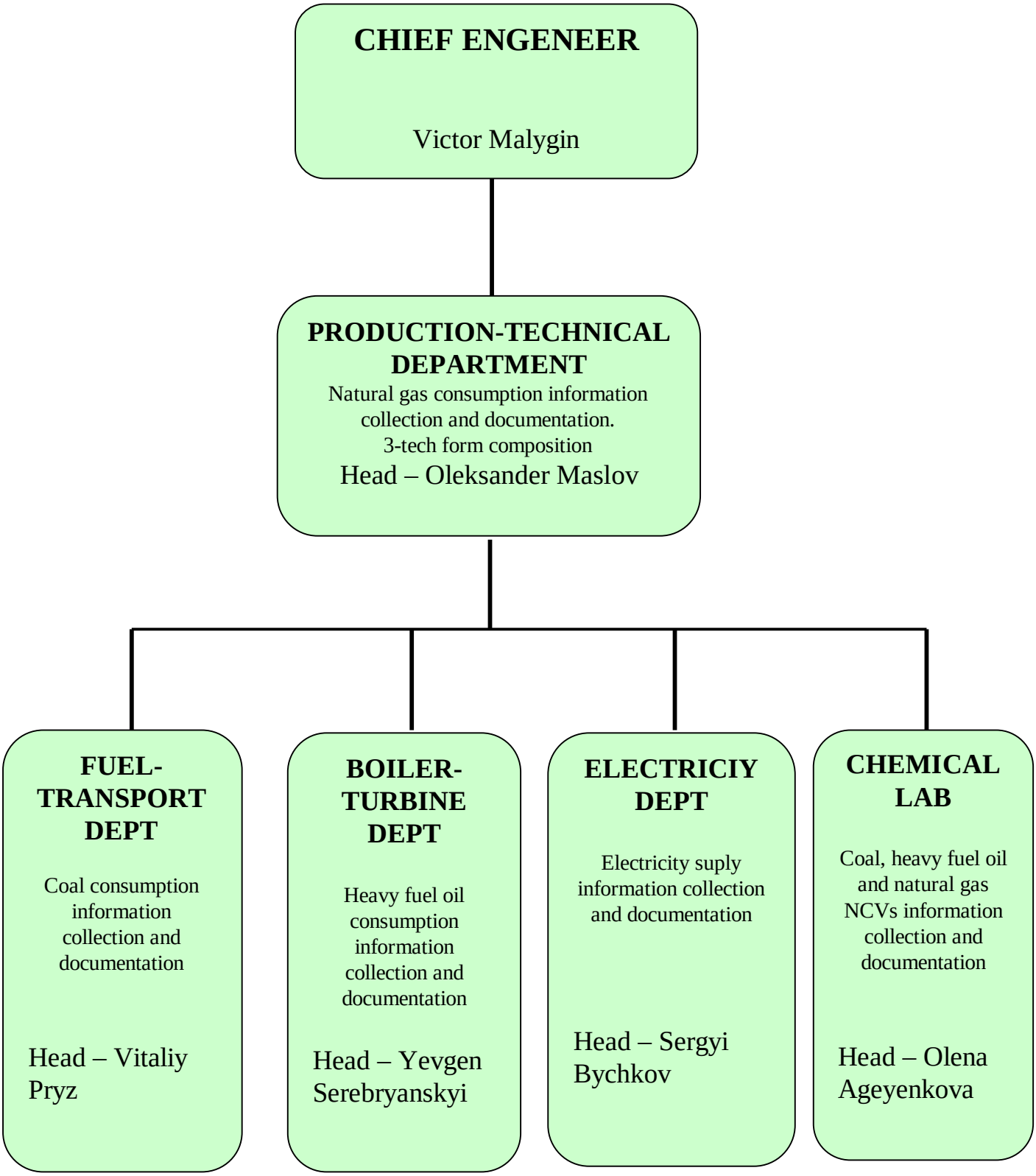
The data of the Net Caloric Value of the fuel is being provided to the TPD by the certified laboratory of the TPP daily.

The TPD collects all the data and calculate the Specific Fuel Rate daily. After that, the data is being summarized in the monthly reports and in the annual report called “3-tech” Form.

All the measures are being sent to the project manager of the “ELTA” company, who collects the data, calculates the emission, emission reductions and creates a monitoring report.

All the data shall be stored in the paper and electronic form at the TPP and in the data base of the “ELTA” company during all lifetime of the project.

B.1. The monitoring information flow at the TPP



B.2. Monitoring equipment.

B.2.1. Electricity supply meters.

As it was mentioned, all the data, needed for the monitoring are shown in the 3-tech form “technical-economic parameters of the equipment operation”. But this information is being crosschecked by the metering equipment indications and calculations. The information about the crosscheck is provided below

Table B.1. The measuring instruments, used for the electricity supply metering during monitoring period

№	Instrument	Connection	Work parameter	Functionality	Type of the meter	Serial number	Level of accuracy	Installation date	Date of the last calibration	Date of the next calibration	Calibration organization*
1	2	3	4	5	6	7	8	9	10	11	12
1	Electricity meter	Pobeda Mykhaylivka-1	KWh	main	EA02-RAL-P4C-4W	01198723	0,2s	09.2009y	08.2009y	08.2015y	LCSM
2	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147086	0,2s	07.2007y	11.2006y	11.20012y	Elstermetronika
3	Electricity meter	Mykhaylivka-1	KWh	main	EA02-RAL-P4C-4W	01198738	0,2s	09.2009y	08.2009y	08.2015y	LCSM
4	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147061	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
5	Electricity meter	Mykhaylivka -2	KWh	main	EA02-RAL-P4C-4W	01198727	0,2s	10.2009y	08.2009y	08.2015y	LCSM
6	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147078	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
7	Electricity meter	Mykhaylivka -3	KWh	main	EA02-RAL-P4C-4W	01198720	0,2s	09.2009y	08.2009y	08.2015y	LCSM

8	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147050	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
9	Electricity meter	Mykhaylivka -4	KWh	main	EA02-RAL-P4C-4W	01198725	0,2s	09.2009y	08.2009y	08.2015y	LCSM
10	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147030	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
11	Electricity meter	Komunarska-1	KWh	main	EA02-RAL-P4C-4W	01198719	0,2s	10.2009y	08.2009y	08.2015y	LCSM
12	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147057	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
13	Electricity meter	Komunarska -2	KWh	main	EA02-RAL-P4C-4W	01198743	0,2s	09.2009y	08.2009y	08.2015y	LCSM
14	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147055	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
15	Electricity meter	Kirova-1	KWh	main	EA02-RAL-P4C-4W	01198748	0,2s	09.2009y	08.2009y	08.2015y	LCSM
16	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147066	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
17	Electricity meter	Kirova-2	KWh	main	EA02-RAL-P4C-4W	01198730	0,2s	09.2009y	08.2009y	08.2015y	LCSM
18	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147040	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
19	Electricity meter	Uvileyna	KWh	main	EA02-RAL-P4C-4W	01198717	0,2s	09.2009y	08.2009y	08.2015y	LCSM
20	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147043	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
21	Electricity meter	Lisychanska	KWh	main	EA02-RAL-P4C-4W	01198746	0,2s	04.2010y	08.2009y	08.2015y	LCSM
22	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147073	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika

23	Electricity meter	Sysoyevo	KWh	main	SL – 7000	36043255	0,2s	03.2008y	1q.2008y	1q.2014y	SE ”Donetskstandartmetrologiya”
24	Electricity meter		KWh	dupl	SL - 7000	36043252	0,2s	12.2005y	4q.2005y	4q.2011y	SE ”Donetskstandartmetrologiya”
25	Electricity meter	OVV-220 кV	KWh	main	EA02-RAL-P4C-4W	01198736	0,2s	09.2009y	08.2009y	08.2015y	LCSM
26	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147092	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
27	Electricity meter	ShSOVV-220 кV	KWh	main	SL 7000	36043254	0,2s	12.2005y	4q.2005y	4q.2011y	SE ”Donetskstandartmetrologiya”
28	Electricity meter		KWh	dupl	EA02-RAL-P4C-4W	01198726	0,2s	10.2009y	08.2009y	08.2015y	LCSM
29	Electricity meter	Kosiora	KWh	main	EA02-RAL-P4C-4W	01198740	0,2s	07.2010y	03.2010y	03.2016y	LCSM
30	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147056	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
31	Electricity meter	Kirova	KWh	main	EA02-RAL-P4C-4W	01198745	0,2s	10.2009y	08.2009y	08.2015y	LCSM
32	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147063	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
33	Electricity meter	Luhanska	KWh	main	EA02-RAL-P4C-4W	01198729	0,2s	10.2009y	08.2009y	08.2015y	LCSM
34	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147071	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
35	Electricity meter	Petrovska	KWh	main	EA02-RAL-P4C-4W	01198741	0,2s	10.2009y	08.2009y	08.2015y	LCSM
36	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147031	0,2s	01.2008y	11.2006y	11.2012y	Elstermetronika

37	Electricity meter	Novoaydarska	KWh	main	EA02-RAL-P4C-4W	01198744	0,2s	10.2009y	08.2009y	08.2015y	LCSM
38	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147038	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
39	Electricity meter	Novoaydarska NPS	KWh	main	EA02-RAL-P4C-4W	01198735	0,2s	10.2009y	08.2009y	08.2015y	LCSM
40	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147060	0,2s	12.2007	11.2006y	11.2012y	Elstermetronika
41	Electricity meter	Schastya	KWh	main	EA02-RAL-P4C-4W	01198718	0,2s	10.2009y	08.2009y	08.2015y	LCSM
42	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147087	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
43	Electricity meter	Poliv	KWh	main	EA02-RAL-P4C-4W	01198721	0,2s	10.2009y	08.2009y	08.2015y	LCSM
44	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147059	0,2s	07.2007y	11.2006y	11.2012y	Elstermetronika
45	Electricity meter	OVV-110 кV	KWh	main	EA02-RAL-P4C-4W	01198739	0,2s	10.2009y	08.2009y	08.2015y	LCSM
46	Electricity meter		KWh	dupl	EA02-RAL-C4-W	01147075	0,2s	03.2008y	01.2008y	01.2014y	LCSM
47	Electricity meter	9TG	KWh	main	AIR-3-OL-C4T	01013158	0,2	03.2011y	01.2011y	03.2017y	LCSM
48	Electricity meter		KWh	dupl	СТК3-02Q2T3Mt	36053	0,2	03.2007y	12.2006y	12.2012y	Telekartpribor
49	Electricity meter	10TG	KWh	main	AIR-3-OL-C4T	01015404	0,2	11.2009y	09.2009y	09.2015y	LCSM
50	Electricity meter		KWh	dupl	СТК3-02Q2T3Mt	36051	0,2	03.2007y	12.2006y	12.2012y	Telekartpribor
51	Electricity meter	11TG	KWh	main	AIR-3-OL-C4T	01013143	0,2	04.2010y	03.2010y	03.2016y	LCSM
52	Electricity meter		KWh	dupl	СТК3-02Q2T3Mt	36054	0,2	03.2007y	12.2006y	12.2012y	Telekartpribor

53	Electricity meter	13TG	KWh	main	AIR-3-OL-C4T	01015420	0,2	03.2010y	09.2009y	09.2015y	LCSM
54	Electricity meter		KWh	dupl	СТК3-02Q2T3Mt	36049	0,2	03.2007y	12.2006y	12.2012y	Telekartpribor
55	Electricity meter	14TG	KWh	main	AIR-3-OL-C4T	01013154	0,2	10.2009y	07.2009y	07.2015y	LCSM
56	Electricity meter		KWh	dupl	СТК3-02Q2T3Mt	36050	0,2	03.2007y	12.2006y	12.2012y	Telekartpribor
57	Electricity meter	15TG	KWh	main	AIR-3-OL-C4T	01013152	0,2	05.2010y	03.2010y	10.2016y	LCSM
58	Electricity meter		KWh	dupl	СТК3-02Q2T3Mt	36052	0,2	03.2007y	12.2006y	12.2012y	Telekartpribor
59	Electricity meter	КТР DOK	KWh	main	СТК3-10Q2T3Mt	36098	1,0	06.2007y	12.2006y	12.2012y	Telekartpribor
60	Electricity meter	Novy ochisny sporudy 1	KWh	main	EA05-RL-C3-W	01147100	0,5s	03.2008y	01.2008y	01.2014y	LCSM
61	Electricity meter	Novy ochisny sporudy 1a	KWh	main	EA05-RL-C3-W	01147107	0,5s	03.2008y	01.2008y	01.2014y	LCSM
62	Electricity meter	КТР Pischanyi karyer	KWh	main	СТК3-10Q2T3Mt	36044	1,0	04.2009y	06.2008y	06.2014y	LCSM
63	Electricity meter	КТР EUM	KWh	main	СТК3-10Q2T3Mt	36047	1,0	06.2007y	12.2006y	12.2012y	Telekartpribor
64	Electricity meter	КТР ABZ	KWh	main	СТК3-10Q2H4Mt	36092	1,0	06.2007y	12.2006y	12.2012y	Telekartpribor
65	Electricity meter	ZTP of the ORS's Base	KWh	main	СТК3-10Q2H4Mt	36093	1,0	06.2007y	12.2006y	12.2012y	Telekartpribor
66	Electricity meter	КТР ATC	KWh	main	СТК3-10Q2H4Mt	36094	1,0	06.2007y	12.2006y	12.2012y	Telekartpribor
67	Electricity meter	«Socis» Ltd.	KWh	main	СТК3-10Q2T3Mt	36045	1,0	07.2007y	12.2006y	12.2012y	Telekartpribor
68	Electricity meter	"Zhylposyolok"	KWh	main	EA05-RAL-C3-W	01147098	0,5s	07.2009y	07.2009y	07.2015y	LCSM

69	Electricity meter	Prudova nasosna	KWh	main	SL 761B071	53000381	0,2s	12.2008y	12.2008y	12.2016y	LCSM

In 2010 Luhanskaya TPP supplied to the National Grid **5 554 576** MW/h of the electrical energy.
During 1.01.2011 – 31.03.2011 – **1 459 450** MWh
* - See Section B.2.3 QA/QC

B.2.2. Fuel consumption

TableB.2. Coal scales used in 2010.

№	Instrument	Work parameter	Type of the meter	Serial number	Accuracy level	Installation date	Date of the last calibration	Date of the next calibration	Calibration organization
1	Electronic strain railroad scales VVET-75.EP-0.P SD TU U 29.2-19377931-001-2006	tons	scales	243	0,15	06.11.08	27.10.10	27.10.11	LCSM
2	Automatic conveyor scales VAK 1202	tons	scales	432	± 1%	27.03.97	23.07.10	23.07.11	LCSM
3	Automatic conveyor scales VAK 1202	tons	scales	435	± 1%	21.03.97	23.07.10	23.07.11	LCSM
4	Electric-strain conveyor scales RAMSEY 14	tons	scales	9430428	± 0.5%	28.04.10	28.04.10	27.04.11	LCSM
5	Electric-strain conveyor scales RAMSEY 14	tons	scales	9430429	± 0.5%	28.04.10	28.04.10	27.04.11	LCSM

In 2010 Luhanskaya TPP consumed **2 840 267** tons of coal.
During 1.01.2011 – 31.03.2011 – **754 351** tons of coal.

The heavy fuel oil consumption per period is defined by the stationary measuring instrument (log scale), which is mounted on the each heavy fuel oil tank in accordance with the project. According to the calibration table of the each tank, the heavy fuel oil level, measured with the log scale, is evaluated into the heavy fuel oil level in tons. The difference between the levels, measured at the beginning and the end of the period, shows the heavy fuel oil consumption in the period.
In 2010 **1 519** tons of the heavy fuel oil were consumed at the Luhanskaya TPP.

During 1.01.2011 – 31.03.2011 – **234.5** tons.

The natural gas consumption is measured by the meter, which is mounted at the AGDS owned by the “Luhanskgas” Company and fixed by signing by the Luhanskaya TPP, “Luhanskgas” Company a monthly act.

In 2010 Luhanskaya TPP consumed **55 174 000** м3 of the natural gas.

During 1.01.2011 – 31.03.2011 – **4 375 400** м3 of the natural gas.

B.1.3. QA/QC:

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The equipment calibration is done by the organizations, shown in the tables B.1 and B.2 in the following way:

* LCSM – Luhansk SCSMS

B.3. The List of values, used for the GHG emission reduction calculation:

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Table B.5. Default values

Data variable	Source of data	Data unit	Value / Comment
OXIDiy Oxidation factor of the fuel *i* in year *y*	IPCC 1996	Share of the fuel oxidised (%)	estimated : coal – 0.98 (98%); heavy fuel oil – 0.99 (99%); natural gas – 0.995 (99.5%).
EFiy Emission factor of the fuel *i* in year y	IPCC 1996 [2]	tCO2 / TJ	estimated: coal – 96.1 tCO2/TJ (**26.2 tC/TJ**) (sub-bituminous coal)*; heavy fuel oil – 77.4 tCO2/TJ (**21.1 tC/TJ**); natural gas – 56.1 tCO2/TJ (**15.3 tC/TJ).**
SFRb Specific Fuel Rate in the Baseline Scenario	Project Design Document	tef / MWh (GJ / MWh)	0.4379 tef / MWh (12.8305 GJ / MWh)

* the TPP uses as the sub0bituminous coal, as the anthracites. The CO2 Emission factor of the anthracite is higher then that of the sub-bituminous coal. The conservative approach was used for the Emission and the Emission reductions calculation – the Emission factor of the sub-bituminous oal was used. The calculation using both of the coefficients leads to 1 – 2% growth of the value of the Emission and the Emission reductions.

Table B.6. Variables

Data variable	Source of data	Data unit	Value / Comment
SFRy Specific Fuel Rate in year *y*	Calculated and fixed in the 3-tech Form	tef / MWh (GJ / MWh)	The average value for 2010 is 0.4262 tef / MWh (12.4877 GJ / MWh);
SFiy The share of fuel *i*	Calculated and fixed in the 3-tech	Share (%)	For 2010: Coal – 97.3%;

[2] http://www.ipcc-nggip.iges.or.jp/public/gl/pdfiles/rusch1-1.pdf

consumed for energy production in year y	Form		Heavy fuel oil – 0.1%. Natural gas – 2.7%.
AELSy The amount of the electricity supplied to the grid in year *y*	3-tech form and Electricity meters (counters)	MWh	For 2010: 5 554 576 MWh. For 1.01.2011 – 31.03.2011 – 1 459 450 MWh

B.3. Leackage:

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Not applicable.

B.4. Environmental impacts:

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According to the current Ukrainian laws and requirements the measurement of the pollution of dust, soot, NOx, CO, etc. should be monitored and documented. These parameters are reflected in the standard form 2TP-Air (the latest edition was approved by the National Statistics Committee of Ukraine Order #223 dated 30.06.2009). The TPP also receives the Pollution Permission from the Ministry of the Environmental Protection of Ukraine.

B.5. Sustainable Development

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The Project implementation is very important for the region and also for the whole energy sector of Ukraine. The Project significantly improves the ecological situation due to the specific fuel rate lowering and the implementation of the new gas-purification system. All that leads to the GHG emission lowering as far as the pollution level lowering. Besides, the Project is the leading and the pioneer one in the technological level and the equipment usage. It sets the reference point for the whole energy sector of Ukraine. The Project significantly improves the quality of the energy produced and the reliability of its supply. Moreover, the Project creates new jobs for the high qualification personnel in the region.

SECTION C. Calculations of the GHG emission reductions

C.1. Project emission:

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The calculation of the Project Emission (*PEy*) is made using the formula:

$$PEy = \sum(SFRy * SFiy * OXIDi * EFi) * AELSy,$$

where:

PEy – Project emission in year *y* (tons CO_2);

SFRy – specific fuel rate of the station in year *y* (GJ/MWh);

SFiy – share of fuel *i* (coal, natural gas or a heavy fuel oil), consumed in year *y*;

OXIDi - oxidation factor of the fuel *i*;

EFi - emission factor of the fuel *i* consumed (tons CO_2/GJ);

AELSy - the amount of the electricity supplied to the grid in year *y* (MWh).

The calculations are made on the monthly basis and the final result is the sum of the monthly calculations.

Table C.1. Project emission in 2010

Period	Project Emission (tons of CO2 equivalent)
January	628 813
February	607 019
March	528 254
April	469 228
May	485 703
June	524 484
July	560 301
August	549 812
September	495 819
October	512 829
November	511 835
December	586 558

Total 2010	**6 460 655**

Table C.2. Project emission for 1.01.2011 – 31.03.2011

Period	**Project Emission (tons of CO2 equivalent)**
January	532 097
February	562 649
March	567 670
Total for 1.01.2011 – 31.03.2011	**1 662 417**

The example of the monthly calculation:
In March 2010 Luhanskaya TPP supplied to the Grid 467 388 MWh (***AELS***) of the electrical energy. The Specific Fuel Rate (***SFR***) this month was 0.4132 tef/ MWh (12.1068 GJ / MWh). The fuel mix combusted (***SFi***) in March was – coal – 97.8%; heavy fuel oil – 0.1%; natural gas – 2.1%. Thus Project Emission (***PE***) in March was:
PE = ((12.10268 * 0.978 * 0.98 * 0.096) + (12.1068 * 0.001 * 0.99 * 0.0774) + (12.1068 * 0.021 * 0.995 * 0.0561)) * 467 388 = **528 254** tons of CO2 equivalent.

C.2. Baseline emission:

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The calculation of the Baseline Emission (*BEy*) is made using the formula:

$$BEy = \Sigma\,(SFRb * SFiy * OXIDi * EFi) * AELSy,$$

where:
BEy – Baseline emission in year *y* (tons CO_2);

SFRb – specific fuel rate of the station in the Baseline Scenario (GJ/MWh);

SFiy – share of fuel *i* (coal, natural gas or a heavy fuel oil), consumed in year *y*;

OXIDi - oxidation factor of the fuel *i* in year *y*;

EFi - emission factor of the fuel *i* consumed in year y (tons CO_2/GJ);

AELSy - the amount of the electricity supplied to the grid in year *y* (MWh).

The calculations are made on the monthly basis and the final result is the sum of the monthly calculations.

Table C.3. Baseline Emission in 2010

Period	Baseline Emission (tons of CO2 equivalent)
January	660 963
February	638 822
March	559 832
April	483 357
May	491 995
June	528 954
July	559 152
August	548 934
September	502 126
October	525 182
November	521 846
December	617 734
Total 2010	**6 638 895**

Table C.4. Baseline Emission for 1.01.2011 – 31.03.2011

Period	Baseline Emission (tons of CO2 equivalent)
January	557 563
February	595 994
March	603 942
Total for 1.01.2011 – 31.03.2011	**1 757 499**

The example of the monthly calculation:
In March 2010 Luhanskaya TPP supplied to the Grid 467 388 MWh (***AELS***) of the electrical energy. The Specific Fuel Rate (***SFR***) this month was 0.4379 tef/ MW (12.8305 GJ / MW). The fuel mix combusted (***SFi***) in March was – coal – 97.8%; heavy fuel oil – 0.1%; natural gas – 2.1%. Thus Baseline Emission (***BE***) in March was:

BE = ((12.8305 * 0.978 * 0.98 * 0.096) + (12.8305 * 0.001 * 0.99 * 0.0774) + (12.8305 * 0.021 * 0.995 * 0.0561)) * 467 388 = **559 832** tons of CO2 equivalent.

C.3. Leakage:

>>

Not applicable.

C.4. Emission Reductions:

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$$ERy = BEy - PEy \quad ,$$

Where:

ERy – emission reductions achieved by the project activity in year *y*;

BEy – baseline CO2 emission in year *y*;

PEy – project CO2 emission in year *y*.

The example of the monthly calculation:

In March 2010 the baseline emission (*BE*) were 559 832 tons of CO2 equivalent. The Project emission for that period were 528 254 tons of CO2 equivalent. Thus, the emission reductions in March 2010 were:

ER = 559 832 – 528 254 = **31 578** tons of CO2 equivalent.

Table C.5. Emission Reductions in 2010

Period	Emission Reductions (tons of CO2 equivalent)
January	32 150
February	31 802
March	31 578
April	14 129
May	6 292
June	4 469
July	-1 149
August	-877
September	6 307
October	12 353
November	10 010

December	31 176
Total 2010	**178 239**

Table C.6. Emission Reductions for 1.01.2011 – 31.03.2011

Period	Emission Reductions (tons of CO2 equivalent)
January	25 465
February	33 345
March	36 272
Total for 1.01.2011 – 31.03.2011	**95 083**