

CONTENTS

- A. General description of the project activity.
- B. Key monitoring activities
- C. Calculations of the GHG emission reductions

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 2006 – 31st December 2007.

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

Date: December 25th, 2010

A.2. JI registration number:

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JI UA 1000206

A.3. Short description of the Project Activity:

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According to the Project Schedule the preparation measures for the TPP Units’ Reconstructions were implemented on the TPP during 2006 - 2007. These measures included:

In 2006:

- the burner nozzles № 1-8 were changed at the boiler unit of the Unit № 13;
- the dust ducts and the main burners’ shells № 2,7,9,10,11,13 were changed at the boiler unit of the Unit № 13;
- the dust duct nozzles of the main burners № 1,2,8,6,10,11,12,13,14 at the boiler unit of the Unit № 13;
- the gas flues A,B – 0,5t were repaired at the boiler unit of the Unit № 13;
- the boiler drum was repaired at the boiler unit of the Unit № 13;
- the inner casing of the A-separator was repaired at the boiler unit of the Unit № 13;
- the jog hammers of the precipitation electrodes and the corona-forming and precipitation electrodes elements were repaired at the boiler unit of the Unit № 13;

JI PROJECT MONITORING REPORT

4

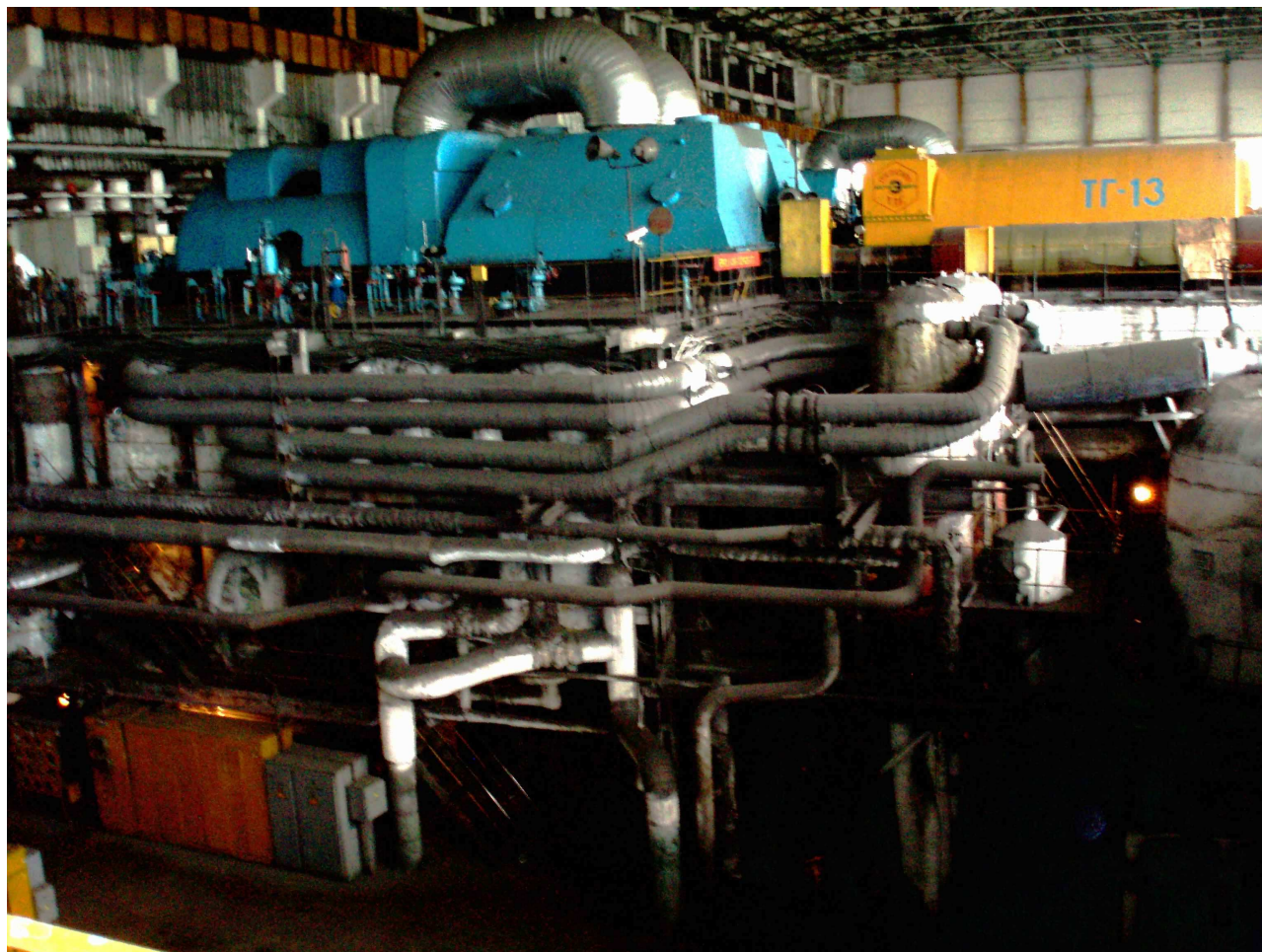
- the furnace seals of the low-pressure cylinder were repaired at the turbine unit of the Unit № 13;
- the inner and outer cleaning of the boiler unit was implemented at the Unit № 14;
- the main and the overflow burners were repaired at the boiler unit of the Unit № 14;
- the primary and the auxiliary steam superheaters, water economizer and explosive valves were repaired at the boiler unit of the Unit № 14;
- the duct reversible screw was repaired at the boiler unit of the Unit № 14;
- the inner and outer cleaning of the boiler unit was implemented at the Unit № 10;
- the separation drum and the heating duct were repaired at the - the inner and outer cleaning of the boiler unit was implemented at the Unit № 10;
- the sealing bearings №6 and 7 were replaced at the turbine unit of the Unit № 10;
- the control and steam distribution system was repaired and the receiver pipes were reconstructed at the turbine unit of the Unit №10;
- the generator rotor was repaired at the Unit № 10;
- the inner and outer cleaning of the boiler unit was implemented at the Unit № 11;
- the main and the overflow burners were repaired at the boiler unit of the Unit № 11;
- the sealing bearings were repaired at the turbine unit of the Unit № 11;
- the control and steam distribution system was repaired and the receiver pipes were reconstructed at the turbine unit of the Unit №11;
- the vacuum system of the turbine was repaired at the Unit № 11;
- the inner and outer cleaning of the boiler unit was implemented at the Unit № 15;
- the sealing bearings were repaired at the turbine unit of the Unit № 15;
- the control and steam distribution system was repaired and the receiver pipes were reconstructed at the turbine unit of the Unit №15;
- the generator rotor was changed at the Unit № 15.

In 2007:

- the high-pressure heater casing was repaired at the turbine unit of the Unit №9;
- the flow part of the high-pressure heater was repaired at the turbine unit of the Unit №9;
- the regulating stage of the high-pressure cylinder was changed at the turbine unit of the Unit №9;
- the high-pressure rotor was balanced at the Unit №9;
- the flow part of the mid-pressure cylinder was repaired and the diaphragms were changed at the stages № 14 and 15 at the turbine unit of the Unit №9;
- the mid-pressure rotor and the blades of the stages № 12, 13, 14, 15 and 16 were changed at the turbine unit of the Unit №9;
- the inner and outer cleaning of the boiler unit was implemented at the Unit № 9;
- 496 packages and 32 collectors were changed at the water economizer of the boiler unit at the Unit №9;
- the packages were changed and the repairs were implemented at the primary and the second steam superheaters at the boiler unit at the Unit №9;
- the scrubbers №1, 2, 3, 4, 5 at the Unit №9;
- the smoke exhausters were repaired including the change of the main wheel at the Unit №9;
- the flow party of the low-pressure cylinder was repaired and the blade unit of the low-pressure rotor was changed at the turbine unit of the Unit №13;
- the inner and outer cleaning of the boiler unit was implemented at the Unit № 13;
- the blade unit of the low-pressure rotor was changed at the turbine unit of the Unit №10;
- the high- and low- pressure heaters were repaired at the Unit №10;
- the inner and outer cleaning of the boiler unit was implemented at the Unit № 10;
- the main burners' nozzles were changed at the boiler unit of the Unit №10;
- the horizontal gas-ducts were repaired at the boiler unit of the Unit №15;

- the exhaust steam feeding collector for the front sealings of the turbogenerator were reconstructed at the Unit №15.

Figure 1 Energy generating Unit №13 of the Luhanskaya TPP



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 **0.4152 tef/MWh (12.1654 GJ/MWh)** in 2006 and **0.4134 tef/MWh (12.1126GJ/MWh)** in 2007.

The Annual electricity supply in 2006 was **4 954 253 MWh**.

The Annual electricity supply in 2007 was **5 777 455 MWh**.

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
		No

A.5. Monitoring Period:

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Date of the Monitoring Period Start: 1.01.2006

Date of the Monitoring Period End: 31.12.2007

A.6. Baseline and Monitoring Methodology applied:

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For the Project the own Approach was provided and determined by the AIE. 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 CO₂ 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

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

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 (*SFR_y*) 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.

For the purposes of the Baseline Emission and Emission Reductions calculation the value of the *SFR_y* parameter was fixed on the 0.4379 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 *SFR_y* 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:

$$SFR_y = \frac{\sum (F_{iy} * NCV_{iy})}{7} / AELS_y \quad (1)$$

Where

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

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

NCV_{iy} – 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;

AE_LS_y - 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 kWh (tons per MWh) 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 2006 at the PDD were determined at the level of 308 135 tons of the CO₂ equivalent, but the Monitoring Report represents this value as 307 962 tons of the CO₂ equivalent. In 2007 the value of the Emission Reductions in the PDD was 388 337 tons of the CO₂

equivalent and 395 214 tons of the CO2 equivalent in the Monitoring Report. 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.

- Dyatlov Olexander Yevgenievich, 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

JI PROJECT MONITORING REPORT

11

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.

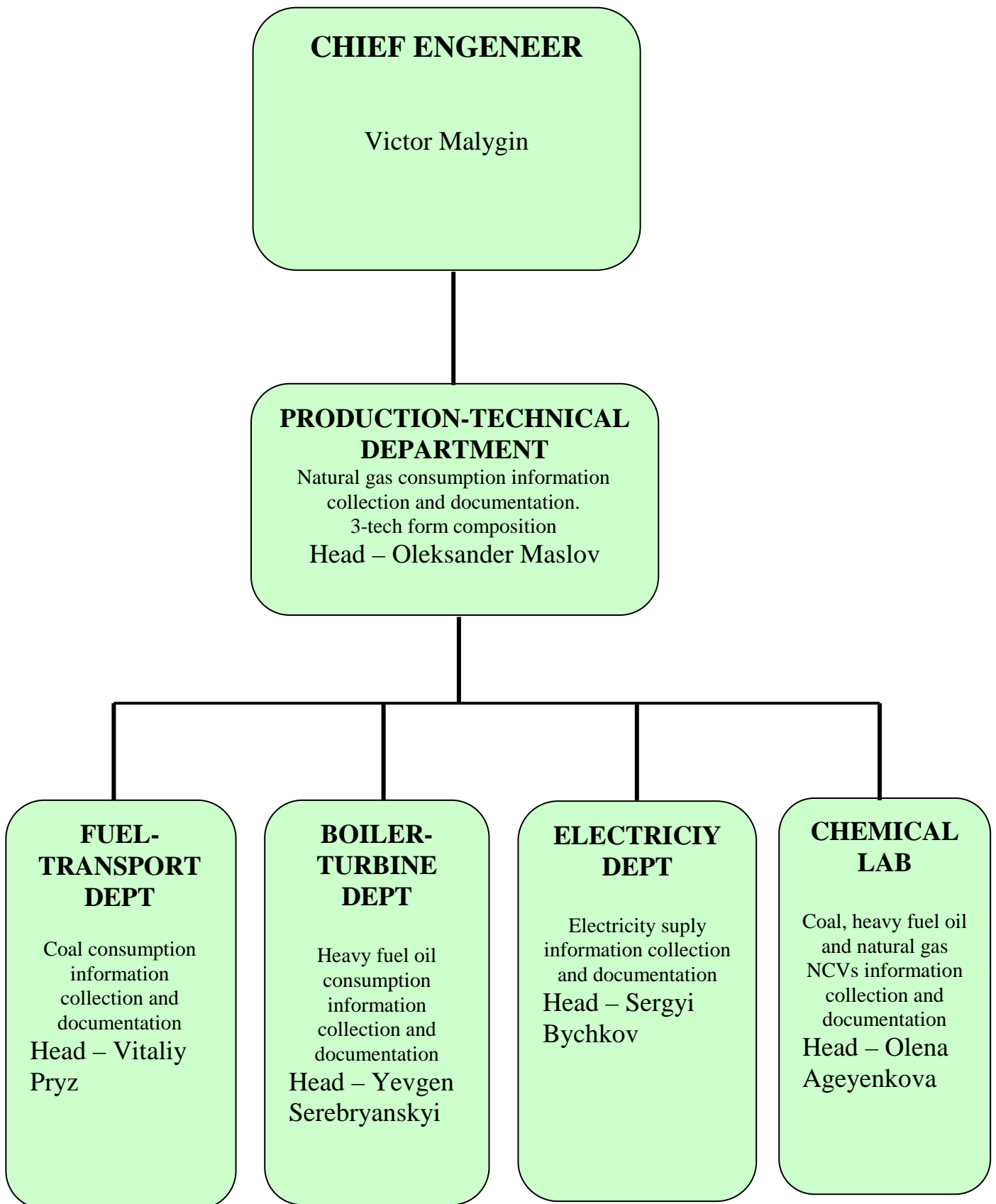
The data of the Net Caloric Value of the fuel is being provided to the TPD by the certified laboratory of the TPP daily.

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 “technicoeconomic parameters of the equipment operation”. But this information is being cross-checked by the metering equipment indications and calculations. The information about the cross-check is provided below

Table B.1. The measuring instruments, used for the electricity supply metering in 2006

№	Instrument	Connection	Work parameter	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
1	Electricity meter	Peremoga	KW/h	A1R-3-AL-C8-T	1010685	0,2	07.2004y.	07.2004y.	07.2010y.	LCSM
2	Electricity meter	Mykhaylivka-1	KW/h	A1R-3-AL-C8-T	1013457	0,2	05.2004y.	05.2004y.	05.2010y.	LCSM
3	Electricity meter	Mykhaylivka -2	KW/h	A1R-3-AL-C8-T	1013455	0,2	05.2004y.	05.2004y.	05.2010y.	LCSM
4	Electricity meter	Mykhaylivka -3	KW/h	A1R-3-AL-C8-T	1010694	0,2	06.2004y.	06.2004y.	06.2010y.	LCSM
5	Electricity meter	Mykhaylivka -4	KW/h	A1R-3-AL-C8-T	1010696	0,2	08.2004y.	08.2004y.	08.2010y.	LCSM
6	Electricity meter	Komunarska-1	KW/h	A1R-3-AL-C8-T	1010690	0,2	08.2004y.	08.2004y.	08.2010y.	

JI PROJECT MONITORING REPORT

14

										LCSM
7	Electricity meter	Komunarska -2	KW/h	A1R-3-AL-C8-T	1010688	0,2	05.2004y.	05.2004y.	05.2010y.	LCSM
8	Electricity meter	Kirova-1	KW/h	A1R-3-AL-C8-T	1010700	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
9	Electricity meter	Kirova-2	KW/h	A1R-3-AL-C8-T	1010689	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
10	Electricity meter	Uvileyna	KW/h	A1R-3-AL-C8-T	1010695	0,2	07.2004y.	07.2004y.	07.2010y.	LCSM
11	Electricity meter	Lisychanska	KW/h	A1R-3-AL-C8-T	1010687	0,2	06.2004y.	06.2004y.	06.2010y.	LCSM
12	Electricity meter	Sysoyevo	KW/h	ZMU-205C	6516566 6	0,2	09.2006y.	08.2006y.	08.2012y.	LCSM
13	Electricity meter	OVV-220 kV	KW/h	A1R-3-AL-C8-T	1010692	0,2	07.2003y.	07.2003y.	07.2009y.	LCSM
14	Electricity meter	ShSOVV-220 kV	KW/h	A1R-3-AL-C8-T	1010691	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
15	Electricity meter	Kosiora	KW/h	A1R-3-AL-C8-T	1010699	0,2	04.2004y.	04.2004y.	04.2010y.	LCSM
16	Electricity meter	Kirova	KW/h	A1R-3-AL-C8-T	1013458	0,2	05.2003y.	05.2003y.	05.2009y.	LCSM
17	Electricity meter	Luhanska	KW/h	A1R-3-AL-C8-T	1013460	0,2	05.2003y.	05.2003y.	05.2009y.	LCSM
18	Electricity meter	Petrovska	KW/h	A1R-3-AL-C8-T	1013459	0,2	04.2004y.	04.2004y.	04.2010y.	LCSM
19	Electricity meter	Novoaydarska	KW/h	A1R-3-AL-C8-T	1010693	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM

JI PROJECT MONITORING REPORT

15

20	Electricity meter	Novoaydarska NPS	KW/h	A1R-3-AL-C8-T	1013146	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
21	Electricity meter	Schastya	KW/h	A1R-3-0L-C4-T	1013147	0,2	02.2003y.	02.2003y.	02.2009y.	LCSM
22	Electricity meter	Poliv	KW/h	A1R-3-0L-C4-T	1013154	0,2	02.2003y.	02.2003y.	02.2009y.	LCSM
23	Electricity meter	OVV-110 kV	KW/h	A1R-3-AL-C8-T	1013456	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
24	Electricity meter	KTP-EUM	KW/h	CTK3-10Q2T3Mt	36047	1	10.2006y.	11.2006y.	11.2012y.	LCSM
25	Electricity meter	ZRU 6 kV «Socis Ltd.»	KW/h	CTK3-10Q2T3Mt	36045	1	10.2006y.	11.2006y.	11.2012y.	LCSM
28	Electricity meter	KTP Pischanyi karyer	KW/h	CA4Y-II672M	332417	2	05.2005y.	06.2005y.	06.2009y.	LCSM
29	Electricity meter	KTP DOK	KW/h	CTK3-10Q2H4Mt	36098	1	10.2006y.	11.2006y.	11.2012y.	LCSM
30	Electricity meter	KTP ATC	KW/h	CTK3-10Q2H4Mt	36094	1	10.2006y.	11.2006y.	11.2012y.	LCSM
31	Electricity meter	KTP ABZ	KW/h	CTK3-10Q2H4Mt	36092	1	10.2006y.	11.2006y.	11.2012y.	LCSM
32	Electricity meter	ZTP of the ORS' base	KW/h	CTK3-10Q2H4Mt	36093	1	10.2006y.	11.2006y.	11.2012y.	LCSM
33	Electricity meter	KTP-19	KW/h	CTK3-10Q2H4Mt	36096	1	10.2006y.	11.2006y.	11.2012y.	LCSM
34	Electricity meter	KTP-20	KW/h	CTK3-10Q2H4Mt	36097	1	10.2006y.	11.2006y.	11.2012y.	LCSM
35	Electricity meter	ZTP-16	KW/h	CA4Y-II672M	425506	2	10.2006y.	10.2008y.	10.2014y.	

JI PROJECT MONITORING REPORT

16

											LCSM
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In 2006 Luhanskaya TPP supplied to the National Grid **4 954 253** MW/h of the electrical energy.

* - See Section B.2.3 QA/QC

Table B.2. The measuring instruments, used for the electricity supply metering in 2007.

№	Instrument	Connection	Work parameter	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
1	Electricity meter	Peremoga	KW/h	A1R-3-AL-C8-T	1010685	0,2	07.2004y.	07.2004y.	07.2010y.	LCSM
2	Electricity meter	Mykhaylivka-1	KW/h	A1R-3-AL-C8-T	1013457	0,2	05.2004y.	05.2004y.	05.2010y.	LCSM
3	Electricity meter	Mykhaylivka -2	KW/h	A1R-3-AL-C8-T	1013455	0,2	05.2004y.	05.2004y.	05.2010y.	LCSM
4	Electricity meter	Mykhaylivka -3	KW/h	A1R-3-AL-C8-T	1010694	0,2	06.2004y.	06.2004y.	06.2010y.	LCSM
5	Electricity meter	Mykhaylivka -4	KW/h	A1R-3-AL-C8-T	1010696	0,2	08.2004y.	08.2004y.	08.2010y.	LCSM
6	Electricity meter	Komunarska-1	KW/h	A1R-3-AL-C8-T	1010690	0,2	08.2004y.	08.2004y.	08.2010y.	LCSM
7	Electricity meter	Komunarska -2	KW/h	A1R-3-AL-C8-T	1010688	0,2	05.2004y.	05.2004y.	05.2010y.	LCSM

JI PROJECT MONITORING REPORT

17

8	Electricity meter	Kirova-1	KW/h	A1R-3-AL-C8-T	1010700	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
9	Electricity meter	Kirova-2	KW/h	A1R-3-AL-C8-T	1010689	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
10	Electricity meter	Uvileyna	KW/h	A1R-3-AL-C8-T	1010695	0,2	07.2004y.	07.2004y.	07.2010y.	LCSM
11	Electricity meter	Lisychanska	KW/h	A1R-3-AL-C8-T	1010687	0,2	06.2004y.	06.2004y.	06.2010y.	LCSM
12	Electricity meter	Sysoyevo	KW/h	ZMU-205C	6516566 6	0,2	09.2006y.	08.2006y.	08.2012y.	LCSM
13	Electricity meter	OVV-220 kV	KW/h	A1R-3-AL-C8-T	1010692	0,2	07.2003y.	07.2003y.	07.2009y.	LCSM
14	Electricity meter	ShSOVV-220 kV	KW/h	A1R-3-AL-C8-T	1010691	0,2	09.2004y.	09.2004y.	09.2010y.	LCSM
15	Electricity meter	Kosiora	KW/h	A1R-3-AL-C8-T	1010699	0,2	04.2004y.	04.2004y.	04.2010y.	LCSM
16	Electricity meter	Kirova	KW/h	A1R-3-AL-C8-T	1013458	0,2	05.2003y.	05.2003y.	05.2009y.	LCSM
17	Electricity meter	Luhanska	KW/h	A1R-3-AL-C8-T	1013460	0,2	05.2003y.	05.2003y.	05.2009y.	LCSM
18	Electricity meter	Petrovska	KW/h	A1R-3-AL-C8-T	1013459	0,2	04.2004y.	04.2004y.	04.2010y.	LCSM
19	Electricity meter	Novoaydarska	KW/h	A1R-3-AL-C8-T	1010693	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
20	Electricity meter	Novoaydarska NPS	KW/h	A1R-3-AL-C8-T	1013146	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
21	Electricity meter	Schastya	KW/h	A1R-3-0L-C4-T	1013147	0,2	02.2003y.	02.2003y.	02.2009y.	

JI PROJECT MONITORING REPORT

18

										LCSM
22	Electricity meter	Poliv	KW/h	A1R-3-0L-C4-T	1013154	0,2	02.2003y.	02.2003y.	02.2009y.	LCSM
23	Electricity meter	OVV-110 kV	KW/h	A1R-3-AL-C8-T	1013456	0,2	03.2004y.	03.2004y.	03.2010y.	LCSM
24	Electricity meter	KTP-EUM	KW/h	CTK3-10Q2T3Mt	36047	1	10.2006y.	11.2006y.	11.2012y.	LCSM
25	Electricity meter	ZRU 6 kV «Socis Ltd.»	KW/h	CTK3-10Q2T3Mt	36045	1	10.2006y.	11.2006y.	11.2012y.	LCSM
28	Electricity meter	KTP Pischanyi karyer	KW/h	CA4Y-II672M	332417	2	05.2005y.	06.2005y.	06.2009y.	LCSM
29	Electricity meter	KTP DOK	KW/h	CTK3-10Q2H4Mt	36098	1	10.2006y.	11.2006y.	11.2012y.	LCSM
30	Electricity meter	KTP ATC	KW/h	CTK3-10Q2H4Mt	36094	1	10.2006y.	11.2006y.	11.2012y.	LCSM
31	Electricity meter	KTP ABZ	KW/h	CTK3-10Q2H4Mt	36092	1	10.2006y.	11.2006y.	11.2012y.	LCSM
32	Electricity meter	ZTP of the ORS' base	KW/h	CTK3-10Q2H4Mt	36093	1	10.2006y.	11.2006y.	11.2012y.	LCSM
33	Electricity meter	KTP-19	KW/h	CTK3-10Q2H4Mt	36096	1	10.2006y.	11.2006y.	11.2012y.	LCSM
34	Electricity meter	KTP-20	KW/h	CTK3-10Q2H4Mt	36097	1	10.2006y.	11.2006y.	11.2012y.	LCSM
35	Electricity meter	ZTP-16	KW/h	CA4Y-II672M	425506	2	10.2006y.	10.2008y.	10.2014y.	LCSM

In 2007 Luhanskaya TPP supplied to the National Grid **5 777 455** MW/h of the electrical energy.

* - See Section B.2.3 QA/QC

B.2.2. Fuel consumption

TableB.3. Coal scales used in 2006.

№	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	Conveyor weigher	т	1202 VAK	432	± 1%	18.09.1996	25.07.2006г	25.07.2007г	Methrologist of the TA and C Depr
2	Conveyor weigher	т	1202VAK	435	± 1%	18.09.1996	25.07.2006г	25.07.2007г	Methrologist of the TA and C Depr

In 2006 Luhanskaya TPP consumed **2 382 200** tons of coal.

TableB.4. Coal scales used in 2007.

№	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	Conveyor weigher	т	1202 VAK	432	± 1%	18.09.1996	17.08.2007г	17.08.2008г	Methrologist of the TA and C Depr
2	Conveyor weigher	т	1202VAK	435	± 1%	18.09.1996	17.08.2007г	17.08.2008г	Methrologist of the TA and C Depr

In 2007 Luhanskaya TPP consumed **2 807 700** 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

JI PROJECT MONITORING REPORT

20

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 2006 **33 000** tons of the heavy fuel oil were consumed at the Luhanskaya TPP; in 2007 - **33 200** 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 2006 Luhanskaya TPP consumed **0** m³ of the natural gas; in 2007 – **4 607 400**m³ 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
<i>OXID_{iy}</i> 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%).
<i>EF_{iy}</i> Emission factor of the fuel i in year y	IPCC 1996	tCO ₂ / TJ	estimated: coal – 96 tCO ₂ /TJ (sub-bituminous coal); heavy fuel oil – 77 tCO ₂ /TJ natural gas – 56 tCO ₂ /TJ
<i>SFR_b</i> Specific Fuel Rate in the Baseline Scenario	Project Design Document	tef / MWh (GJ / MWh)	0.4379 tef / MWh (12.8305 GJ / MWh)

Table B.6. Variables

Data variable	Source of data	Data unit	Value / Comment
<i>SFR_y</i> Specific Fuel Rate in year y	Calculated and fixed in the 3-tech Form	tef / MWh (GJ / MWh)	The average value for 2006 is 0.4152 tef / MWh (12.1654 GJ / MWh); In 2007 – 0.4134 tef / MWh (12.1126 GJ / MWh)
<i>SF_{iy}</i> The share of fuel i consumed for energy production in year y	Calculated and fixed in the 3-tech Form	Share (%)	For 2006: Coal – 97.8%; Heavy fuel oil – 0.2%. Natural gas – 2.0%. For 2007:

			Coal – 98.2%; Heavy fuel oil – 0.1%. Natural gas – 1.7%.
<i>AELSy</i> The amount of the electricity supplied to the grid in year y	3-tech form and Electricity meters (counters)	MWh	For 2006: 4 954 253 MWh. For 2007: 5 777 455 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, NO_x, 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 (the latest one is #1423310600 received 27.02.2009, valid through 27.02.2016).

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 it's 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. <u>Project emission:</u>

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

$$PE_y = \sum(SFR_y * SF_{iy} * OXID_i * EFi) * AELS_y,$$

where:

PE_y – Project emission in year *y* (tons CO₂);

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

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

OXID_i - oxidation factor of the fuel *i*;

EF_i - emission factor of the fuel *i* consumed (tons CO₂/GJ);

AELS_y - 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 2006

Period	Project Emission (tons of CO2 equivalent)
<i>January</i>	520 302
<i>February</i>	482 436
<i>March</i>	514 416
<i>April</i>	396 819
<i>May</i>	399 228
<i>June</i>	401 942
<i>July</i>	527 490
<i>August</i>	435 819
<i>September</i>	409 912
<i>October</i>	467 462
<i>November</i>	531 146
<i>December</i>	534 439
Total 2006	5 621 411

Table C.2. Project emission in 2007

Period	Project Emission (tons of CO2 equivalent)
<i>January</i>	544 310

<i>February</i>	538 631
<i>March</i>	520 104
<i>April</i>	428 736
<i>May</i>	512 187
<i>June</i>	526 856
<i>July</i>	518 871
<i>August</i>	545 383
<i>September</i>	567 975
<i>October</i>	601 270
<i>November</i>	633 888
<i>December</i>	596 792
Total 2007	6 535 004

The example of the monthly calculation:

In March 2006 Luhanskaya TPP supplied to the Grid 455 821 MWh (*AELS*) of the electrical energy. The Specific Fuel Rate (*SFR*) this month was 0.4114 tef/MW (12.0540 GJ / MW). The fuel mix combusted (*SFi*) in March was – coal – 98.7%; heavy fuel oil – 0.2%; natural gas – 1.1%. Thus Project Emission (*PE*) in March was:

$$PE = ((12.0540 * 0.987 * 0.98 * 0.096) + (12.0540 * 0.011 * 0.99 * 0.0774) + (12.0540 * 0.011 * 0.995 * 0.0561)) * 455 821 = 514 416 \text{ tons of CO}_2 \text{ equivalent.}$$

C.2. Baseline emission:

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

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

where:

BEy – Baseline emission in year y (tons CO₂);

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 CO₂/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 2006

Period	Baseline Emission (tons of CO2 equivalent)
<i>January</i>	557 817
<i>February</i>	516 540
<i>March</i>	545 538
<i>April</i>	418 785
<i>May</i>	416 178
<i>June</i>	415 328
<i>July</i>	541 214
<i>August</i>	449 435
<i>September</i>	431 277
<i>October</i>	490 132
<i>November</i>	572 176
<i>December</i>	574 953
Total 2006	5 929 372

Table C.4. Baseline Emission in 2007

Period	Baseline Emission (tons of CO2 equivalent)
<i>January</i>	584 918
<i>February</i>	580 002
<i>March</i>	558 348
<i>April</i>	456 700
<i>May</i>	540 752
<i>June</i>	550 425
<i>July</i>	537 302
<i>August</i>	567 354
<i>September</i>	599 191
<i>October</i>	638 257
<i>November</i>	675 678
<i>December</i>	635 476
Total 2007	6 924 403

The example of the monthly calculation:

In March 2006 Luhanskaya TPP supplied to the Grid 455 821 MWh (*AELS*) of the electrical energy. The Specific Fuel Rate (*SFR*) this month was 0.4379 tef/MWh (12.8305 GJ / MWh). The fuel mix combusted (*SFi*) in March was – coal –

JI PROJECT MONITORING REPORT

28

98.7%; heavy fuel oil – 0.2%; natural gas – 1.1%. Thus Baseline Emission (*BE*) in March was:

$$BE = ((12.8305 * 0.987 * 0.98 * 0.096) + (12.8305 * 0.011 * 0.99 * 0.0774) + (12.8305 * 0.011 * 0.995 * 0.0561)) * 455\ 821 = 545\ 538 \text{ tons of CO}_2 \text{ equivalent.}$$

C.3. Leakage:

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Not applicable.

C.4. Emission Reductions:

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The calculation of the Emission Reductions (*ER_y*) is made using the formula:

$$ER_y = BE_y - PE_y \text{ ,}$$

Where:

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

BE_y – baseline CO₂ emission in year y;

PE_y – project CO₂ emission in year y.

The example of the monthly calculation:

In March 2006 the baseline emission (*BE*) were 545 538 tons of CO₂ equivalent. The Project emission for that period were 514 416 tons of CO₂ equivalent. Thus, the emission reductions in march 2006 were: $ER = 545\ 538 - 514\ 416 = 31\ 122$ tons of CO₂ equivalent.

Table C.5. Emission Reductions in 2006

Period	Emission Reductions (tons of CO₂ equivalent)
<i>January</i>	37 515
<i>February</i>	34 104
<i>March</i>	31 122
<i>April</i>	21 965
<i>May</i>	16 950
<i>June</i>	13 386
<i>July</i>	13 724
<i>August</i>	13 617
<i>September</i>	21 365
<i>October</i>	22 670

JI PROJECT MONITORING REPORT

29

<i>November</i>	41 029
<i>December</i>	40 515
Total 2006	307 962

Table C.6. Emission Reductions in 2007

Period	Emission Reductions (tons of CO2 equivalent)
<i>January</i>	40 608
<i>February</i>	41 370
<i>March</i>	38 244
<i>April</i>	27 964
<i>May</i>	28 566
<i>June</i>	23 568
<i>July</i>	18 431
<i>August</i>	21 970
<i>September</i>	31 216
<i>October</i>	36 987
<i>November</i>	41 790
<i>December</i>	38 684
Total 2007	389 399