

**JI monitoring report #2**  
**Monitoring period: 01.01.2009 – 31.12.2009**

**Version: 02 dated 19.08.2010**

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- B.** Key monitoring activities
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## **Section A. General information on project activities and monitoring information**

### **A.1. Title of the project activity**

“Reconstruction of Kramatorsk heat and power plant”

### **A.2. JI registration number**

The JI project “Reconstruction of Kramatorsk HPP” has received the Letter of Approval from Ukraine, reference 1469/23/7 dated 04.12.2009. The Letter of Approval from investor country Germany dated 25.03.2010. The JI project has registration number UA1000156.

### **A.3. Short description of the project activity**

According to the data of Kramatorsk HPP as a result of implemented reconstruction of HPP and rehabilitation of heat supply network the following natural gas and power savings in 2009 occurred:

Natural gas savings from HPP reconstruction, ths. m <sup>3</sup>	35 044
Natural gas saving from heat supply network rehabilitation, ths. m <sup>3</sup>	1 157
Power savings from heat exchangers replacement, MWh	1 856

### **A.4. Monitoring period**

Starting date: 01.01.2009

Closing date: 31.12.2009

### **A.5. Methodology applied to the project activities**

#### **A.5.1. Baseline methodology**

For determination of the baseline the JI specific approach based on approved methodology ACM0002 «Consolidated methodology for grid-connected electricity generation from renewable sources» (version 10) is used.

#### **A.5.2. Monitoring methodology**

For monitoring of JI project the JI specific approach based on monitoring methodology ACM0002 «Consolidated methodology for grid-connected electricity generation from renewable sources» (version 10) is used.

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

№	Measures	Beginning of design stage	Beginning of construction	Commissioning
1	Reconstruction of boiler № 7	–	September 2008	January 2009
2	Reconstruction of boiler № 9		April 2008	November 2008
3	Modernization of turbine PT-60-90/13 st. №3	September 2007	April 2008	August 2008
4	Modernization of turbine PT-60-90/13 st. №4	September 2008	April 2009	August 2009
5	Reconstruction of cooling tower № 1	May 2006	June 2008	September 2008
6	Capital repair of boiler-rooms with replacement of tubes and valves	April 2008	June 2008	November 2008
7	Replacement of capacitive heat exchangers by lamellar - 35 units  40 units 65 units 60 units	May 2008  May 2009 May 2010 May 2011	July 2008  July 2009 July 2010 July 2011	November 2008  November 2009 November 2010 November 2011
8	Replacement of heat supply pipelines by pipelines from polyurethane foam	June 2008	June 2008 2009 2010 2011 2012	November 2008 2009 2010 2011 2012
9	Replacement of the feeding pump	-	May 2007	April 2009

Table 1. Status of implementation (according to PDD version 2.2)

The 60 lamellar heat exchangers were installed in 2009 instead of expected 40 units.

#### **A.7. Intended deviations and revisions to the registered PDD**

The amount of generated electric and heat power in the baseline and project scenario pointed in the registered PDD has been changed. It happened because during the PDD development the expected data for 2009 has been given, which differs from actual data in 2009. In the table 2 actual data on heat and power generation in 2009 is given.

<b>Item</b>	<b>2009</b>
Power generation, MWh	343 090
Heat generation, Gcal	547 622

Table 2. Heat and power generation for baseline scenario for the project

#### **A.8. Intended deviations and revisions to the registered monitoring plan**

There are no deviations to the registered monitoring plan.

#### **A.9. Persons responsible for preparation and submission of monitoring report**

The persons responsible for the preparation of the Kramatorsk HPP monitoring report: the First deputy director, Mr. V.S. Potapenko (management); the Head of Production department Mr. A.M. Gusev (in charge for the report preparation).

## **Section B. Key monitoring activities**

### **B.1.1. Monitoring and control system**

The control and monitoring system is divided into three main parts:

- 1) Electrical measurement;
- 2) Heat measurement;
- 3) Fuel measurement (natural gas, coal).

#### **Electrical measurement**

For this project the following electrical measurements are necessary: total generated power, power consumption for the own needs of HPP, power supplied to the consumers.

There are 3 commercial electricity meters at the HPP which measure the electricity generated by turbines.

There are more than one hundred technical and commercial electricity meters which measure power supplied to the consumers and consumption for the own needs of HPP.

Generated power and power supplied to the consumers is present in the reports on generation and supply to the grid and in the extracts from registration journal of the HPP as well as in the reports on power distribution.

#### **Heat measurement**

The HPP is equipped with heat measurement devices, which allow determining the amount of heat supplied to the consumers. The amount of heat generated at the HPP is also present in the journal of heat supplied to the consumers.

Determination of heat economy from heating system reconstruction is executed on the basis of calculation of decrease in thermal energy consumption through restored thermal insulation and reduction of network water consumption. Data on heat supply to the consumers from boiler-rooms is saved in the journal of accounting of heat supplied to the consumers (boiler-rooms' data).

To determine the amount of heat generated by boilers №№ 7, 9 the data on generated steam by these boilers is used. The HPP is equipped by special flow-meters which measure the amount of generated steam by boilers №№ 7, 9.

## **Measurement of fuel consumption (natural gas, coal)**

### *Measurement of natural gas consumption*

The volume of consumed gas is measured by means of “Universal-02” gas flow meter. The meter’s software is intended for transformation of the incoming signals from the gas flow meters, vortex converters of consumption, transformation and measuring of incoming signals from converters of measured pressure and gas temperature, calculation and reduction with accordance to conditions set in GOST 2939-63 (standard conditions) of its volume and volume consumption. “Universal-02” gas flow meter is allowed for serial production and use in Ukraine and is entered into state register under the reference Y759-01.

“Universal-02” gas flow meter keeps in its memory the archives of parameters which are combined into hourly and daily archives of energy carriers’ consumption, emergency cases and access to the operative memory device with possibility of its transfer to a PC via RS232 or RS485 interfaces for further processing and printing.

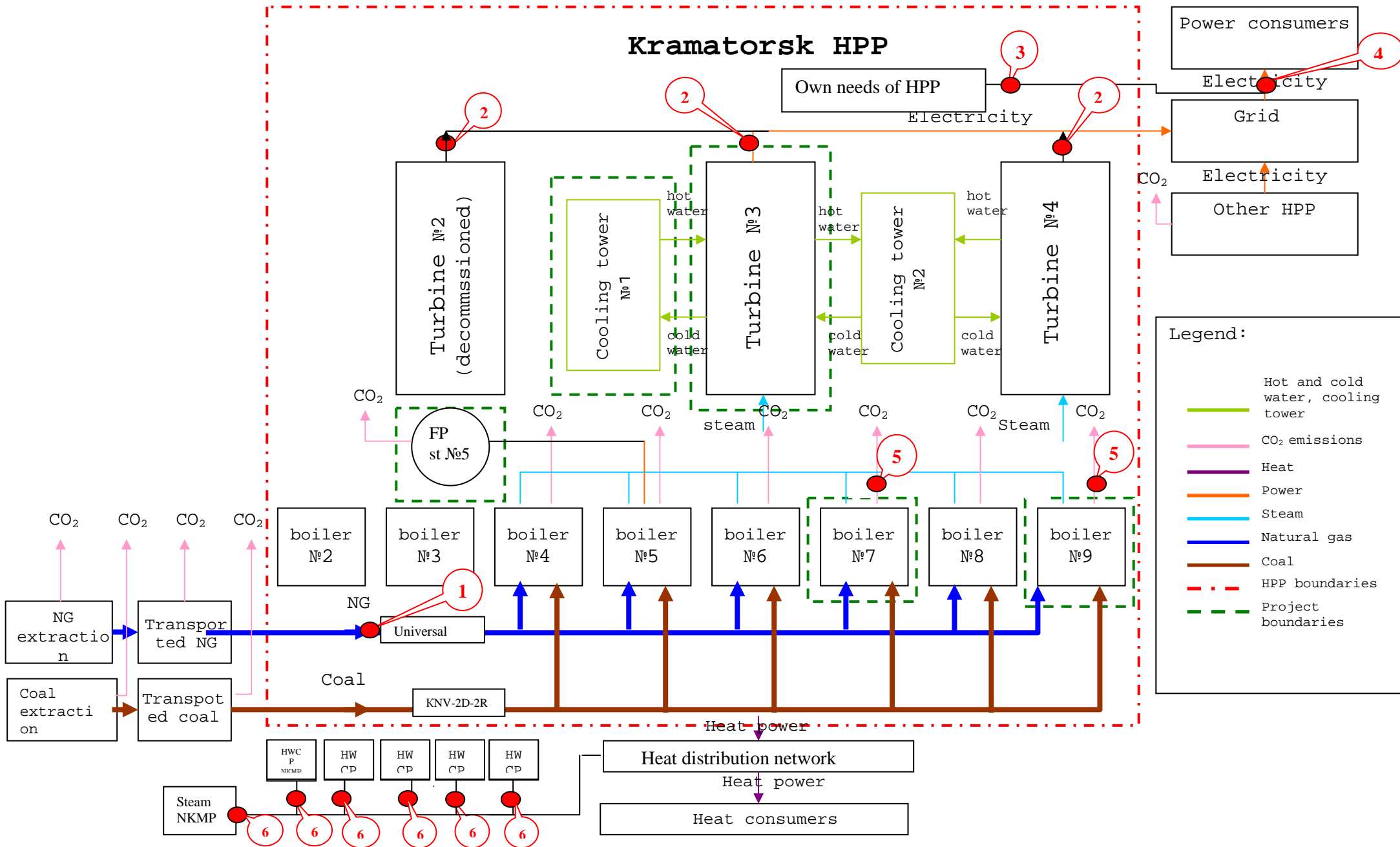
Data on quality of natural gas (physical and chemical indicators) are put into the program “Universal-02” manually according to a quality passport or a telephone message (in case of indicators changes) given by Kramatorsk Department of gasification and gas supply.

The supply reports of natural gas, diagrams of fuel and journals of fuel accounting are used for cross-checking the amount of consumed natural gas.

### *Measurement of coal*

In 2009 the arrival of coal had been controlled by two scales. The RS-150C13V, which was leased from Novokramatorsk machine building plant (NKMB) controls the compliance of coal arrival with accompanying forms before beginning the unloading. The conveyer scales KNV-2D-2R is used to control the coal consumption.

The scheme of measuring devices location which controls the abovementioned parameters is given below in Figure 1.



Note: 1 - «Universal-02» gas flow meter      3- technical flow meters of power for own needs      5 – devices of generated steam measuring  
 2- technical flow meters of generated power      4 – commercial flow meters of power supplied to the grid      6 - devices of heat carrier accounting  
 HWCP - heating water converter plant; FP-feeding pump.

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### **B.1.2. Information on equipment used**

The control and monitoring system is divided into three main parts:

- 4) Electrical measurement;
- 5) Heat measurement;
- 6) Fuel measurement (natural gas, coal).

#### **1) Electricity measurements**

For this project the measurement of the following electrical parameters are necessary: total generated power, power consumption for own needs of HPP, power supplied to consumers.

#### ***The measurement of generated power***

In table 3 the data on meters which measure generated power is given.

Serial number	Installed at	Data as of 01.01.2010	Data as of 01.01.2009	Difference	Coefficient	Power, kWh	Notes
289410	Generator-2	0	0	0	480	0	
	Generator -3	830358	801501	28857	960	27 702 720	replacement
235550	Generator -3	3296852	1423164	1873688	96	179 874 048	
	Generator -4	781035	763190	17845	960	17 131 200	replacement
289479	Generator -4	2585573	1352423	1233150	96	118 382 400	

Table 3. Data on meters for generated power measurement



### *Measurement of power supplied to consumers*

In the table 4 data on electricity meters which measure the amount of power supplied to the consumers is given.

Serial number	Installed at	Data as of 01.01.2010	Data as of 01.01.2009	Difference	Coefficient	Power, kWh	Notes
01073888	Section LIP 1	25505	0	25505	132	3 366 660	
	Section LIP 1	254577	159893	94684	132	12 498 288	replacement
01076223	Section LIP 2	73826	0	73826	132	9 745 032	
	Section LIP 2	211163	114070	97093	132	12 816 276	replacement
01059075	Section Druzhkovka 1	73250	0	73250	132	9 669 000	
	Section Druzhkovka 1	1299289	1238434	60855	132	8 032 860	replacement
01073869	Section Druzhkovka 2	50513	0	50513	132	6 667 716	
	Section Druzhkovka 2	206107	130621	75486	132	9 964 152	replacement
	Section Druzhkovka 2	0	0	0	132	0	replacement
01082976	Section Kujbisheva 1	120816	0	120816	88	10 631 808	
	Section Kujbisheva 1	2651617	2398030	253587	88	22 315 656	replacement
	Section Kujbisheva 1					563	shortage
01083001	Section Kujbisheva 2	3743340	3317789	425551	66	28 086 366	
0102709	Section NKMZ-110	1695179	1243302	451877	66	29 823 882	
	PGV-3	624494	103898	520596	132	68 718 672	
2821188	Section ShSMV			0	1320	0	maintenance
10412	Section LEP-1 35 kV	149220	69492	79728	140	11 161 920	
4402	Section LEP-2 35 kV	201382	117770	83612	140	11 705 680	
3898	Section Drozhzhevoj 1	0	0	0	3.6	0	
	Section Drozhzhevoj 1					23 461	shortage
3834	Section Drozhzhevoj 2	243	243	0	24	0	
01030346	Section CRP 1	261416	254582	6834	72	492048	
01030369	Section CRP 4	918987	883937	35050	72	2523600	
01030353	Section Jel. pech' 10	244222	73784	170438	72	12271536	
01030367	Section RP 1 ceh 11	374249	369768	4481	72	322632	
01030368	Section Pidstancija 11	378044	351082	26962	72	1941264	
01030365	Section Pidstancija 9	540029	466814	73215	96	7028640	
01030352	Section Pidstancija 17	313873	290076	23797	72	1713384	
01030361	Section Pidstancija 8-1	555635	544806	10829	72	779688	
01030355	Section Pidstancija 3-1	120582	106526	14056	72	1012032	
01030364	Section CRP 2	646301	557304	88997	72	6407784	
01030372	Section Pidstancija 6	76217	75815	402	72	28944	
01030362	Section Kompresornaja 1	611916	581730	30186	72	2173392	
01030366	Section Pidstancija 7	577885	575008	2877	72	207144	

01030371	Section Pidstancija 3-2	260228	217425	42803	72	3081816	
01030354	Section Pidstancija 5	237850	217643	20207	72	1454904	
01030356	Section Pidstancija 8-2	897972	806243	91729	72	6604488	
01030359	Section Jel. pech' 6	773782	628436	145346	90	13081140	
01030344	Section RP 25	506858	460734	46124	180	8302320	
	RP 70	1243167	203482	1039685	7.2	7485732	
01030348	Section of process water pump 4	758154	757442	712	12	8544	
01030357	Section of process water pump 5	1058852	953100	105752	18	1903536	
01030345	Section Skvazhina 20	2118908	855542	1263366	0.4	505346	
	Heating water pump # 1	897672	211304	686368	0.9	617731	
	Heating water pump # 2	1477714	118482	1359232	1.2	1631078	
	Heating water pump # 3	949482	188699	760783	1.8	1369409	
	Heating water pump # 4	268167	1	268166	7.2	1930795	
	Heating water pump # 5	534941	240379	294562	1.2	353474	
	Heating water pump # 6	520063	241435	278628	1.2	334354	
	Heating water pump # 7	905859	156197	749662	1.2	899594	
	Heating water pump # 9	231527	24	231503	1.8	416705	
	Heating water pump #10	1679192	907968	771224	1.2	925469	
	Heating water pump #11	922449	6322	916127	1.2	1099352	
	Heating water pump #12	1842209	454949	1387260	1.8	2497068	
	Heating water pump #13	1689199	714166	975033	1.8	1755059	
	Heating water pump #14	424329	51755	372574	1.8	670633	
	Heating water pump #15	2002924	188992	1813932	1.8	3265078	
	Heating water pump #16	958022	779090	178932	1.8	322078	
	Heating water pump #17	1295552	219648	1075904	1.8	1936627	
	Feedwater pump #1	521430	513984	7446	0.03	223	
	Feedwater pump #2	1423020	69160	1353860	0.03	40616	
	Feedwater pump #3	6222413	1886145	4336268	0.03	130088	
	Feedwater pump #4	0	0	0	0.03	0	
	Feedwater pump #6	4123017	2079014	2044003	0.03	61320	
	Feedwater pump #7	3561843	2048330	1513513	0.04	60541	
	Feedwater pump #8	3853587	1120183	2733404	0.03	82002	
	Feedwater pump	3359501	2631478	728023	0.03	21841	

	makeup demineralizer #1						
	Feedwater pump makeup demineralizer #2	16669170	5578979	11090191	0.03	332706	
	Feedwater pump makeup demineralizer #3	5419196	0	5419196	0.03	162576	
	K N B # 1	99	99	0	0.04	0	
	K N B # 2	33	32	1	0.04	0	
	K N B # 3	5049109	1714048	3335061	0.04	133402	
	K N B # 4	1425154	35421	1389733	0.04	55589	
	K N B # 5	6331440	1810860	4520580	0.04	180823	
	K N B # 6	884564	504201	380363	0.04	15215	
	K N B # 7	7308451	0	7308451	0.04	292338	
	K N B # 8	2010917	240834	1770083	0.04	70803	
	K N B # 9	9776750	4944893	4831857	0.04	193274	
	K N B #10	2462508	79007	2383501	0.04	95340	
3637	Section NIPTMASH 1	1840555	1461244	379311	7.2	2731039	
4394	Section NIPTMASH 2	0	0	0	720	0	
4396	Section NIPTMASH 3	1217218	990412	226806	12	2721672	
	Section NIPTMASH 4	70955	48680	22275	12	267300	replacement
3796	Section NIPTMASH 4	207461	0	207461	12	2489532	
	TOV "Novij Mir"	27514	0	27514	0.2	5503	
1777721	JSC "Urozhaj"	2910963	1581182	1329781	2.4	3191474	
	Amstor-1	650855	521910	128945	1.2	154734	replacement
	Amstor-1	904118	0	904118	1.2	1084942	
	Amstor-2	593688	488798	104890	1.8	188802	replacement
	Amstor-2	736877	0	736877	1.8	1326379	
	TOV "Astelit"	4396629	4313000	83629	0.01	836	replacement
	TOV "Astelit"	142946	21	142925	0.1	14293	
	UMC-1	8524342	3573109	4951233	0.01	49512	
	UMC-2	4677409	1470302	3207107	0.01	32071	
	CSC "Kievstar GSM"	53098	28958.1	24139.9	1	24140	
	JSC "SKMZ"	1737239	1682373	54866	7.2	395035	
3654	Otd.Socgorod 1	103082	0	103082	7.2	742 190	
	Otd.Socgorod 1	3621301	2550946	1070355	7.2	7 706 556	replacement
	Otd.Socgorod 1					450	shortage
4534	Otd.Socgorod 2	272849	0	272849	7.2	1 964 513	
	Otd.Socgorod 2	3811397	2846696	964701	7.2	6 945 847	replacement
4524	Otd.Socgorod 3	3918602	2746501	1172101	7.2	8 439 127	
4395	Otd.Socgorod 4	3361230	2238665	1122565	7.2	8 082 468	
3740	Otd.Socgorod 5	1757428	1250589	506839	12	6 082 068	
3713	Otd.Socgorod 7	1502655	1000635	502020	12	6 024 240	
4592	Otd.Socgorod 8	1561883	1074297	487586	12	5 851 032	
161286	Otd.Boks 1	6724	3890	2834	20	56680	
6888108	Otd.Tunnel	10038	5707	4331	1	4331	

39785	Ostanovka KTTU	0	0	0	1	0	
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Table 4. Data on electricity meters for power supplied to the consumers

**Measurement of power used for own needs of HPP**

Power consumption for own needs of HPP is calculated as difference between generated power and power supplied to the consumers from the plant buses.

**2) Heat measurement**

Data on measurement devices for heat supplied to the consumers from Kramatorsk HPP is given in the table 5.

**The measurement of heat supplied to the consumers**

Measurement device	Producer (company, country)	Work parameter	Serial number	Accuracy rate %	Installation date	Generated heat, Gcal	Date of last calibration	Date of next calibration	Remark
1	2	3	4	5	6	7	8	9	10
Additional feeding HWCP №3 SVTU-10M  Supply HWCP №3 SVTU -10M	Kyiv, Company «Sempal Ko Ltd»	Heat	12018	2.0	21.11.08	2463	07.05.07	07.05.11	The amount of generated heat is received as accumulated result per year
		Heat	14295	2.0	21.11.08	55146	04.08.08	04.08.12	
Additional feeding HWCP №4 SVTU-10M  Supply HWCP №4 SVTU-10M	Kyiv, Company «Sempal Ko Ltd»	Heat	11815	2.0	21.11.08	3198	07.05.07	07.05.11	The amount of generated heat is received as accumulated result per year
		Heat	14357	2.0	21.11.08	64064	04.08.08	04.08.12	
Additional feeding HWCP №5 SVTU-10M  Supply HWCP №5 SVTU-10M	Kyiv, Company «Sempal Ko Ltd»	Heat	14135	2.0	21.11.08	8758	24.06.08	24.06.12	The amount of generated heat is received as accumulated result per year
		Heat	14262	2.0	21.11.08	176648	05.08.06	05.08.12	
Additional feeding HWCP №6 SVTU -10M  Supply HWCP №6 SVTU-10M	Kyiv, Company «Sempal Ko Ltd»	Heat	11757	2.0	21.11.08	12241	07.05.07	07.05.11	The amount of generated heat is received as accumulated result per year
		Heat	14390	2.0	21.11.08	140720	05.08.08	05.08.12	
Additional feeding HWCP № 2 SVTU-10M	Kyiv, Company «Sempal Ko Ltd»	Heat	11911	2.0	21.11.08	-	07.05.07	07.05.11	The amount of generated

									heat is received as accumulated result per year
Heat energy supply to NKMP Additional feeding : Leakage	«Spetsssystemy» Belorus	Water consumption for additional feeding	0609009	0,4	14.12.06	73469 1862	28.09.06	28.09.10	Passport
UVR-011	Kharkiv city, JSC «Tahion»	Network water consumption	1080	1,0	14.12.06	No data	26.08.08	26.08.10	Passport
TSP-Metran-206 TSP-Metran-206	CJSC PG «Metran»	Temperature of network water	565545 565546	B B	14.12.06 14.12.06	No data	18.08.08 18.08.08	18.08.09 18.08.09	Passport

Table 5. Data on flow meters of heat supplied to consumers

Data on the amount of steam generated by boiler №№ 7, 9 is used for calculation of heat generated by boilers №№ 7, 9. Information on measuring devices for steam generated by boilers №№ 7, 9 is given in the table 6.

Measurement device	Producer (company, country)	Work parameter	Serial number	Accuracy rate %	Installation date	Data 01.01.2008	Steam generated by boilers №№7,9	Date of last calibration	Date of next calibration	Remarks
Boiler №7 Secondary RP160-09 Primary DM 3583 M	Ukraine, Lviv	Superheated vapour	1120476 12048	1.0 1.5	10.09.08	No summator	660568	07.09.08	07.09.09	Passport
Boiler №9 Secondary RP160-09 Primary DM 3583 M	Ukraine, Lviv	Superheated vapour	2091175 14176	1.0 1.5	15.02.01	No summator	881785	19.02.09	19.02.10	Passport

Table 6. Data on flow meters of steam generated by boiler №№ 7, 9

### 3) Fuel measurement

#### *Natural gas measurement*

Data on “Universal-02” gas flow meter is given in the table 7.

Measurement device	Producer (company, country)	Work parameter	Serial number	Accuracy rate %	Installation date	Natural gas consumption, ths. m <sup>3</sup>	Date of last calibration	Date of next calibration	Remarks
Universal-02	GVP «GREMPIS», Ltd. Vinnitsa Ukraine	Natural gas consumed by boilers	5672	0,2	02.09.07	110 234	29.07.09	29.07.11	Pasport

Table 7. Data on “Universal-02” natural gas flow meter

#### *Coal measurement*

In 2009 the coal consumption had been measured by two scales. Data on RS-150C13V mechanical car scale used for consumed coal measuring is given in table 8. Data on conveyer scale KNV-2D-2R used for consumed coal measuring is given in table 9.

Measuring device	Producer (company, country)	Work parameter	Serial number	Installation date	Coal consumption, t	Date of last calibration	Date of next calibration
RS-150C13V mechanical car scale	Odessa, Ukraine	Coal consumption	0011	12.05.09	192 930	12.05.09	12.05.10

Table 8. Data on RS-150C13V mechanical car scale for measuring of coal amount

Measuring device	Producer (company, country)	Work parameter	Serial number	Installation date	Coal consumption, t	Date of last calibration	Date of next calibration
conveyer scale KNV-2D-2R	Dnipropetrovsk Ukraine	Coal consumption	09178	01.04.09	192 930	07.07.09	07.04.10

Table 9. Data on conveyer scale KNV-2D-2R for measuring of coal consumption

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### B.1.3 Calibration procedure

*For power meters*

Data on calibration of meters used for measuring of total power generation is given in the table 10.

<b>Parameter</b>	<b>Answer (passport data)</b>
Interval between calibrations	6 years
Methodology of procedure of calibration of meters of total power generation	Methodology of Ukrainian Center on standardization and metrology
Period of warranty from the producer	18 months (SL7000)
Body responsible for calibration and certification of the measuring equipment	Methodology of Ukrainian Center on standardization and metrology

Table 10. Data on calibration of electricity meters for total power generation

Data on calibration of electricity meters used for measuring power consumption for own needs of HPP is given in the table 11.

<b>Parameter</b>	<b>Answer (passport data)</b>
Interval between calibrations	6 years
Methodology of procedure of calibration of meters of power consumed for own needs	Methodology of Methodology of Ukrainian Center on standardization and metrology
Period of warranty from the producer	18 months (SL7000)
Body responsible for calibration and certification of the measuring equipment	Ukrainian Center on standardization and metrology

Table 11. Data on calibration of electricity meters used for measuring of power consumed for own needs of HPP

Data on calibration of electricity meters used for measuring of power supplied to consumers is given in the table 12.

<b>Parameter</b>	<b>Answer (passport data)</b>
Interval between calibrations	6 years
Methodology of procedure of calibration of meters of power supplied to consumers	Methodology of Ukrainian Center on standardization and metrology
Period of warranty from the producer	18 months (SL7000)

Body responsible for calibration and certification of the measuring equipment	Ukrainian Center on standardization and metrology
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Table 12. Data on calibration of electricity meters used for measuring of power supplied to consumers

*Measuring devices of heat and generated steam*

Data on calibration of flow-meters used for generated steam by boilers №№ 7, 9 is given in the table 13.

Parameter	Answer (passport data)
Interval between calibrations	1 year
Methodology of procedure of calibration of flow-meters of steam generation	Methodology of State standard
Period of warranty from the producer	1 year
Body responsible for calibration and certification of the measuring equipment	Derzhstandartmetrologiya

Table 13. Data on calibration of flow meters used for measuring steam generation by boilers №№ 7, 9.

Data on calibration of meters for measuring generated heat is given in the table 14.

Parameter	Answer (passport data)
Interval between calibrations	4 years
Methodology of procedure of calibration of meters of heat generation	Methodology of calibration testing is ShIMN.407251.003 I2
Period of warranty from the producer	48 months
Body responsible for calibration and certification of the measuring equipment	Derzhstandartmetrologiya

Table 14. Data on calibration of heat meters of generated heat

*Fuel measuring devices*

***Measuring of natural gas amount***

Data on calibration of “Universal-02” natural gas flow meter is given in the table 15.

Parameter	Answer (passport data)
Interval between calibrations	2 years
Methodology of procedure of calibration of flow-meters of natural gas consumption	Methodology of state metrological attestation GREM.02 0000.001-01.01 PMA and guidance on operation
Period of warranty from the producer	18 months



Body responsible for calibration and certification of the measuring equipment	Derzhstandartmetrologiya
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Table 15. Data on calibration on “Universal-02” natural gas flow meter

***Measuring of coal consumption***

Data on calibration of RS-150C13V mechanical car scale is given in the table 16.

<b>Parameter</b>	<b>Answer (passport data)</b>
Interval between calibrations	1 year
Methodology of procedure of calibration of meters of coal consumption	Calibration testing is done by balance receiver.
Period of warranty from the producer	15 years
Body responsible for calibration and certification of the measuring equipment	Derzhstandartmetrologiya

Table 16. Data on calibration of RS-150C13V mechanical car scale

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#### **B.1.4. Involvement of Third Parties**

Ukrainian Center on standardization and metrology.

#### **B.2. Data collection (accumulated data for whole monitoring period)**

The structure of operation and management of the project is given in the PDD in the figure 2 “Scheme of data collection according to the monitoring plan”.

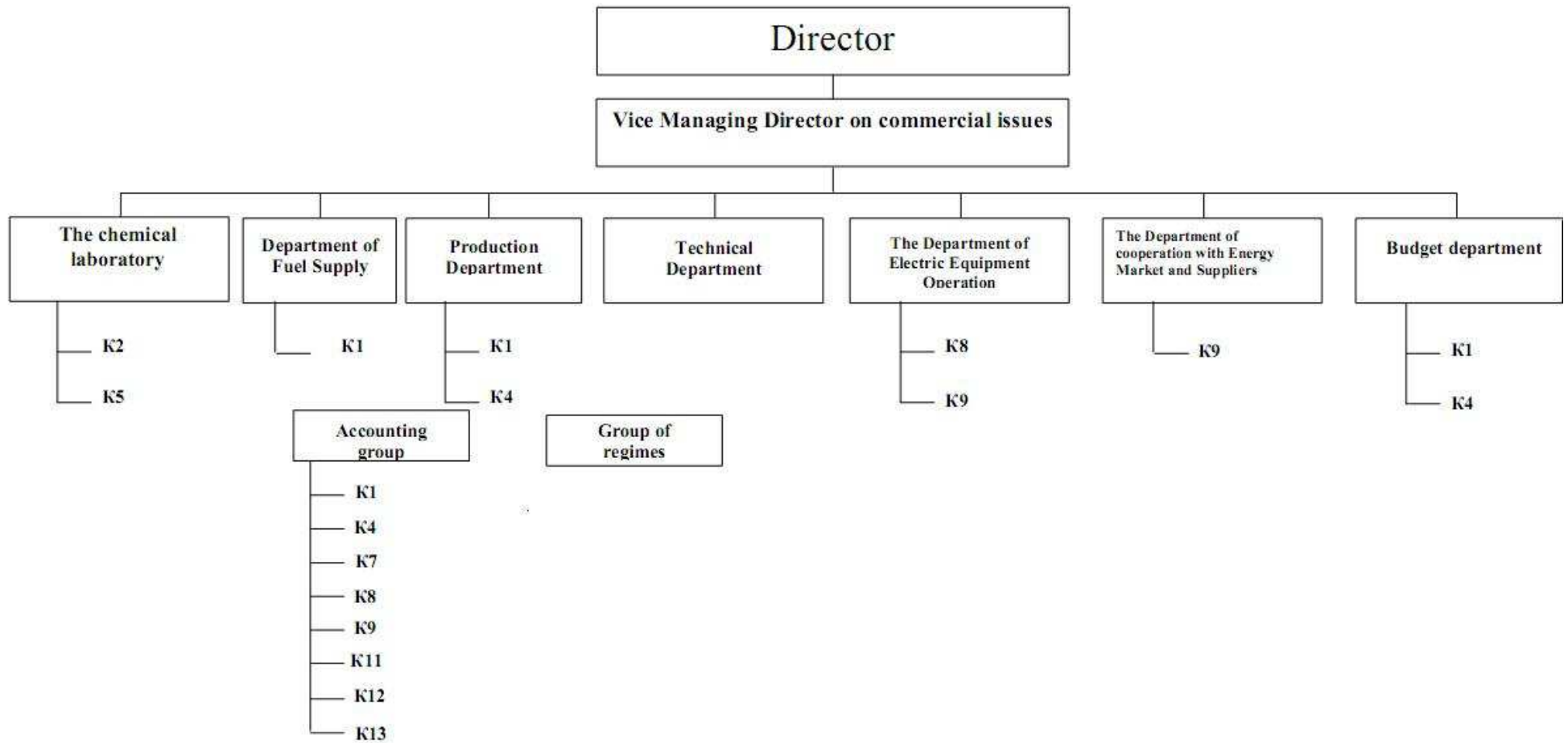


Figure 2. Data collection for the monitoring

### B.2.1. List of other parameters use during the calculation

During the calculation the other parameters which are not measured by measuring equipment are used. These parameters are listed in the table 17 below.

Identification number	Variable	Source of data	Unit	Comment
K3	Carbon emission factor for coal	IPCC	t C/TJ	IPCC values are given in Section 2 of IPCC Guidelines for National Greenhouse Gas Inventories (Volume 2 (Energy), 2006)
K6	Carbon emission factor for natural gas	IPCC	t C/TJ	IPCC values are given in Section 2 of IPCC Guidelines for National Greenhouse Gas Inventories (Volume 2 (Energy), 2006)
K10	Carbon emission factor of the electric grid of Ukraine	Baseline study of UES of Ukraine	t CO <sub>2</sub> /kWh	Carbon emission factor for national grid of Ukraine is given in JI PDD 0018 «Energy saving programme at “Istil” mini steel mill, Ukraine»

Table 17. Parameters used during GHG emissions calculation

### B.2.2. Data concerning leakages

Leakages are not foreseen.

### B.3. Data processing and achieving

All data will be processed and achieved in electronic and/or paper view.

### B.4. Special event log and technological breakdowns

In 2009 at HPP there were a few technical breakdowns.

On April 13, 2009 the turbo generator #4 was stopped due to false operation of protection system.

On September 16, 2009 the boiler #9 was stopped due to false operation of protection system.

On the 14<sup>th</sup> of October 2009 the leak at cover of heat exchanger lead to cutoff of turbo generator #4.

On December 8, 2009 the boiler #9 was switched off due to corrosion of waterwall tube.

### B.5. Procedures for emergency and malfunction handling at Kramatorsk HPP

All malfunctions identified by the staff of Kramatorskteploenergo LLC is recorded into the journals. The department for production procedures, represented by the head of the technical department, commissions internal repair division or an external contractor (depending on the nature of the malfunction), and makes the equipment check after the repair works.

#### **B.6. External data (type of data, source, access)**

In accordance with PDD the following external data were used in the project in 2009.

Parameter	Source	Access
Net calorific value of coal	Report of the Supplier	Fuel supplier certificates are kept at Kramatorskteploenergo LLC
Carbon emission factor for coal	IPCC Guidelines for National Greenhouse Gas Inventories (Volume 2 (Energy), 2006)	Publicly available
Net calorific value of natural gas	Report of the Supplier.	Fuel supplier certificates are kept at Kramatorskteploenergo LLC
Carbon emission factor for natural gas	IPCC Guidelines for National Greenhouse Gas Inventories (Volume 2 (Energy), 2006)	Publicly available
Carbon emission factor of the electric grid of Ukraine	Carbon emission factor for national grid of Ukraine is given in JI PDD 0018 «Energy saving programme at “Istil” mini steel mill, Ukraine»	Publicly available

#### **B.7. Accuracy level of the measurement equipment**

Every type of measurement equipment has its defined accuracy level. As a rule, this level is low. The accounting for inaccuracies at the HPP is regulated by the ‘Instruction on the rules for commercial accounting of electricity’, which is an integral part of the current agreement between the members of the Wholesale electricity market of Ukraine. The inaccuracy level of the electricity measurement devices is kept below 0.5%.

The measurement equipment used for commercial accounting of Kramatorskteploenergo LLC are in compliance with the accuracy level mentioned above. The accuracy of the fuel volumes received by Kramatorskteploenergo LLC is stated in the relevant certificates provided by the supplier; the forms of these certificates are agreed between the consumer, suppliers and with the State Enterprise Derzhstandartmetrologiya (based in Donetsk and Dnipropetrovsk). For the natural gas measurements the accuracy level is 1%, for the hard fuel – 1.5%.

Therefore, the acceptable level of the inaccuracy of the measurements, for which no correction is necessary within the calculations provided below, is set.

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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 is done by the General Director of Kramatorsk HPP and the First Deputy Director. The Director manages and coordinates activity of all departments. Every parameter is monitored by the respective department headed by the Head of the department.

The organizational structure of the data collection at Kramatorsk HPP is presented above in the Section B.2.

#### **C.1.2. Training**

With the purpose of operation of modernized equipment of Kramatorsk HPP the studying of 6 people of operational personnel of “Kramatorskteploenergo”, Ltd. was done at the boiler equipment of the type BKZ-220 of Chernihiv HPP. The cost of training is UAH 21 000.

### **C.2. Internal audit and control measures**

A system of technical tools ‘KTS Energiya’ is used at Kramatorsk HPP as the main internal control instrument. The system is managed by the department of information technologies and communication. The data is collected with the minimum range of 5 minutes for each technological parameter. The system archives the information collected and keeps the archived data for at least one year. The data is collected by the accounting group of the production department.

### **C.3. Information on the social and environmental impacts of the project**

As a result of the project implementation, the local community and the employees of Kramatorsk HPP will have secure workplaces for the long-term perspective, due to the stable operation of the plant. The consumption of the fossil fuels for heat and power generation will be reduced. The project’s implementation will lead to reduction of greenhouse gas and other toxic gases (such as carbon monoxide and nitrogen oxides) emission to the atmosphere. Reducing the amount of greenhouse gas emissions would allow to prevent their further accumulation in the atmosphere and therefore contribute to the climate change mitigation.

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## Section D. Emission reductions calculations

### D.1.1 Project emissions

Project emissions ( $E_p$ ) are calculated by the following formula:

$$E_p = PE_{FC,elec,y} + PE_{heat\_ex}$$

where:

$PE_{FC,elec,y}$  – project emissions from the actual fuel consumed by the power plant for the heat and power production (savings from heat distribution network rehabilitation are not taken into account), t CO<sub>2</sub>.

$PE_{heat\_ex}$  – project emissions from electricity consumption by the boiler rooms where the heat exchangers are to be replaced, t CO<sub>2</sub>.

The emissions after implementation of the project measures are presented below in Table 18.

Year	2009
Emissions, t CO <sub>2</sub> e	358 222

Table 18. Project emissions, t CO<sub>2</sub>e

### D.1.2. Baseline emissions

The following formula is used for calculating the baseline emissions at Kramatorsk HPP ( $BE_y$ ):

$$BE_y = BE_{FC,elec,y} + BE_{electricity,y} + BE_{heat\_ex}$$

where:

$BE_{FC,elec,y}$  – baseline emissions from the fuel combusted at the power plant for heat and power production in the absence of project measures, t CO<sub>2</sub>. Emissions from different fuel types are calculated by multiplying the amount of the fuel of the type ‘i’ by the carbon emission factor (t CO<sub>2</sub> / t (1000 m<sup>3</sup>)) for the fuel I consumed during the year y.

$BE_{electricity,y}$  – baseline emissions from the grid electricity to be replaced due to the project implementation at the power plant, t CO<sub>2</sub>.

$BE_{heat\_ex}$  – baseline emissions from electricity consumption by the boilers, where the heat exchangers are to be replaced, t CO<sub>2</sub>.

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Baseline emissions for the scenario of absence of the project measures are given in the table 19 below.

<b>Year</b>	<b>2009</b>
<b>Baseline emissions, t CO<sub>2</sub>e</b>	386 238

Table 19. Baseline emissions, t CO<sub>2</sub>e

#### **D.1.3. Leakage**

No leakage is expected within the project.

#### **D.1.4. Emission reductions in 2009 due to the project implementation**

Emission reductions due to the project implementation are calculated as the difference between the baseline and the project emissions.

Emission reductions due to the project implementation are given in the table 20 below.

<b>Year</b>	<b>2009</b>
<b>Emission reductions, t CO<sub>2</sub>e</b>	28 016

Table 20. Emission reductions