MONITORING REPORT
July 2011 – October 2012

JI PROJECT

Bulgarian Renewable Energy Portfolio

DELECTRA HYDRO JSC
TRAKIA GAS LTD

Sofia, 2012

Bulgaria

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Abbreviations used

EIA	Environmental Impact Assessment	-
JI	Joint Implementation	-
AIE	Accredited Independent Entity	
PDD	Project Design Document	-
SHPP	Small Hydro Power Plant	-
EU	European Union	-
NEC	National Electric Company	-
NSI	National Statistics Institute	-
RES	Renewable Energy Sources	-
SEWRC	State Energy and Water Regulation Committee	-
$BEF_{grid,y}$	Baseline CO_2 emissions factor for the grid electricity for year **y**	tCO_2/MWh
$EG_{SHPP,i,y}$	Produced electricity, exported to the grid of **i**$^{-th}$ SHPP for year **y**	MWh
$BE_{SHPP,i,y}$	Baseline CO_2 emissions of **i**$^{-th}$ SHPP for year **y**	t CO_2 eq/y
BEtotal	total project baseline emissions (CO_2 equivalent)	t CO_2 eq/y
$PE_{SHPP,i,y}$	Project emissions of **i**$^{-th}$ SHPP for year **y**	t CO_2 eq/y
$LE_{SHPP,i,y}$	Leakage emissions of **i**$^{-th}$ SHPP for year **y**	t CO_2 eq/y
$ER_{SHPP,i,y}$	Emission reductions of **i**$^{-th}$ SHPP for year **y**	t CO_2 eq/y
ERtotal	emission reduction from project activities	t CO_2 eq/y

Introduction

The Monitoring report is prepared in accordance to paragraph 36 of the JI guidelines and is based on the JI - Project Design Document. The present monitoring report provides complete, consistent, clear, and accurate calculation of the emissions reductions, within the boundaries of the each separate subproject, included in the PDD, for the period 01 July 2011 – 30 October 2012.
Reference number of the present Monitoring Report is 002.
Version number of the present Monitoring Report is 01/22.11.2012.

1.1 Project participants

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1.2 Project locations

The project comprises the design, construction, and operation of two Small Hydro Power Stations with a total power capacity of 8.0 MWe (SHPP Tumrush 5 MWe and SHPP Lesitchevo 3 MWe), which generate and export electricity to the national electrical distribution grid.

The projects locations are showed on the map below and are executed in the following plants:

Fig.1.2.1 – SHPP Tumrush and SHPP Lesitchevo locations

1.2.1 Trakia Gas - SHPP Tumrush

SHPP Tumsush situated on a river Tumrushka, close to the village Hrabrino, Municipality Rodopi, area Plovdiv.
The Tumrushka River is a left tributary to the Purvenetcka River, which has formed by merging Tumrushka and Dormushka rivers. The river basin is located at the North slopes of the Rhodopes Mountains, South-West from the town of Plovdiv. The hydrological station 303/72420 located on the Purvenetzka River above the Purvenetz village is in use since 1952. The flow of Tumrushka and Parvenetzka rivers has not influenced by anthropogenic activities. SHPP Tumrush consists of a water capture of mountain type, a pressure pipeline and power station.

1.2.2 Delectra Hydro - SHPP Lesichevo

SHPP Lesitchevo situated close to the village Lesitchevo, area Pazardjik. The SHPP Lesitchevo utilizes the larger part of the water resources of the Belmeken-Sestrimo cascade, formed in the water-collecting areas of the rivers Struma, Mesta, and partly of Iskar river and which after the last stage of the cascade – the LHPP Momina Klisura is transferred for irrigation needs to the Pjasacnik dam and the Pazardjik irrigation system.
The system is one of the most complex ones, built on the territory of the country. The small hydro power plant Lesitchevo will benefit from the used water potential of the cascade Belmeken-Sestrimo. The water fed to the irrigation systems Karabunar, Varvara and Toplonitsa. The waters from HPP Momina Klisura fed to the water collection basin of river Topolnitsa. This has done through a complex system, according to the government's priority.
The larger part of the waters used by the HPP Momina Klisura fed to the Pjasacnik dam from where the waters are regulated the different consumers of the Plovdiv-Pazarjik region.

1.3 Background

Bulgarian energy sector is undergoing a rapid change, mostly driven by EU accession of Bulgaria. The Concept of the Bulgarian Energy Strategy until 2020 has entirely tied to the EU strategy, as Bulgaria is a member of the EU.
The main objectives of the European Energy strategy has based on three priority directions:

- Sustainable development through strict control over negative climate changes;
- Safety of the supplies through reducing of the external dependency;
- Promoting of the united European energy market

Above defined priorities constitutes the long-term quantitative targets of EU as a whole and are valid for all Member States:

- Reduction of the noxious Greenhouse Gases to the target of - 20 % until 2020г compared to the base 1990 year (or 14% against year 2005);
- Increase of the share of the Renewable Energy Sources (RES) in the overall energy consumption - target is 20 % in the year 2020;
- Increase of the energy efficiency - target is 20 % until year 2020.

For fulfilling of those targets, EU determined national objectives based on the GDP level per capita. For countries with a lower GDP level, these objectives have reduced. In that manner, the national objectives for Bulgaria have reduced too.
The increasing of the RES share for the country has constituted to reach 16 % from the gross electricity consumption in year 2020. In comparison, the RES share for the base year 2005 has estimated to 9.4 % and that value has considered because of the operation of bigger HPP plants.
The biggest environmental problems for Bulgaria are bind to operation of the coal power plants. These plants constitute high share in the production of electricity even they work with low-calorific coals. In fact, coal plants are the main source of eruption to the atmosphere of carbon dioxide, sulfurous dioxide and nitrogenous oxides.
The best way to reach lower level of the CO2 emission factor is commissioning of new power plants based on renewable resources. This will help also for bigger Bulgarian independency in the field of energy supplies.

Based on a couple of researches Bulgaria has serious potential of Renewable Energy Sources (RES) that is not absorbed up to the present time. The main three approaches for the assimilation of the RES are water, wind and biomass.
The main benefits to the owners of RES are the preferential purchase prices (feed-in tariffs) that have guaranteed from the Government. National Electricity Company (NEK) and the Electricity Distribution Companies (CEZ, EVN, E.ON) are obliged to buy all produced RES electricity on that tariffs. The two Small Hydro Power Plants Lesitchevo and Tumrush are a contribution to the RES development and are part of the Bulgarian national policy for 16% RES share in the gross electricity consumption during year 2020.

1.4 Description of the project activities

The purpose of the project is to generate electricity using renewable hydraulic energy sources in Bulgaria to meet the increasing regional and national energy demand. The project aims to install run-of river small-scale hydropower plants at two locations:

1. Tumrush (Trakija Gas)
2. Lesitchevo (Delektra Hydro)

1.4.1 SHPP Tumrush

Trakia Gas LTD is the company that constructed and operated with SHPP Turmush. The company is owner of the hydro power plant.
The construction of the run-of-river Small Hydro Power Plant (SHPP) Tumrush for the generation and sales of electricity was finalized in July 2005.
The scheme provides the construction of the plant without a reservoir for levelling of the river flow fluctuations. For the full usage of the available flow the plant is going to operate continuously at river flows not less than 0.200 m3/s.
The scheme for the construction SHPP Tumrush includes the following main components:

- Water intake (with a settling chamber and pressure basin) – to collect water (see the picture below). The water intake is constructed at the elevation of 715.00 m. The water intake structure allows the processing of river flows up to 1.80-2.00m3/s;
- Pressure pipeline – facility for transport the water from the water intake to the SHPP' turbine, ensuring the necessary pressure for its operation. The pressure pipeline is of steel design with diameter of of 1,000 mm, laid in a trench 4,500 m in length. The average inclination is 22.42%. The gross head of the pressure pipeline is 355m. The pipeline can accommodate different flows with varying hydraulic losses. Within the optimum water velocity, the pipeline can provide a flow of 1.80 m3/s with 23.76 m hydraulic losses resulting a net head at the turbine of 331.24 m.;

- The building of the SHPP with mechanical and electrical equipment, necessary for energy production and lower channel for outflow the used water back to the river. One vertical axis turbine is delivered with a nominal generator capacity 5,300 kW, which fully covers the energy capacity of the project. See the picture:

The monthly average quantities of water for power station processing have given in the table below:

Monthly distribution of river Tumrush discharge														
Month		1	2	3	4	5	6	7	8	9	10	11	12	**Qmav**
Q w.av.	[m^3/s]	0.674	0.800	1.694	2.680	3.124	1.545	0.740	0.386	0.279	0.290	0.353	0.611	**1.100**

Table A.4.1.4.1 Characteristics of River Discharge for a Mean-Water Year

The common technical characteristics of the installed equipment have shown in the table below:

No.	Parameter	Dimension	Value
SHPP Tumrush Data			
1	Average built-up water flow	[m^3/s]	1.10
2	Annually processed water quantity	[м^3]	15,694,000
3	SHPP rated electrical power	[кW]	5,000
4	Annually availability at rated power	[h/y]	2,660
5	Annually electricity produced	[MWh/y]	13,300
Turbines			
1	Type of the turbines	-	Vertical type "Pelton" Type V3-G1-5/300/40-1/740/266 "Va Tech" Germany production
2	Turbo units number	[pcs.]	1
3	Intake pipe diameter	[mm]	DN 500
3	Nozzles number	[pcs.]	5
4	Rated flow	[m^3/s]	1.8
6	Minimal flow	[m^3/s]	0.09
7	Head	[m]	335
8	Output rated turbine speed	[rev./min]	1,000
9	Runaway speed	[rev./min]	1,800
10	Impeller diameter	[mm]	740
11	Rated turbine power	[кW]	5,301
Generator			
1	Generator type	-	Synchronous vertical Lerroy Somer production
2	Generators number	[pcs.]	1
3	Rated voltage	[kV]	3.3
4	Frequency	[Hz]	50
5	Power factor cos f	-	0.9
6	Generator rated speed	[rev./min]	1,000
7	Rated full power	[kVA]	5,716
8	Cooling		Air cooling
9	Windings isolation class	-	F/F

Table 1.4.1.2 Main equipment technical characteristics

Transformer			
	Transformer type	-	Two windings oil Type Hyundai TM 6000/20
	Transformers number	[pcs]	1
	Windings connection scheme	-	YNd11
	Rated voltage- second side	[kV]	20
	Rated voltage- first side	[kV]	3.3
	Frequency	[Hz]	50
	Cooling system		ONAN
	Rated power (standard)	[kVA]	6,000

Table 1.4.1.2 Main equipment technical characteristics - continued

The turbine efficiency is relatively high based on the following:

- Allows for a high percentage of usage of the available river flow;
- The turbine operate with relatively high efficiency (82%) even at flows under 5% of the design flow (Qmin = 0.090 m^3/s, at Qdesign = 1.80 m^3/s);

A high total efficiency is being maintained (registered at the high voltage outlet of the transformer)in a wide range of flows:

River Flow (m^3/s)	Efficiency (%)
0.100 ÷ 0.300	70 ÷ 80
0.300 ÷ 0.600	80 ÷ 85
0.600 ÷ 0.750	85 ÷ 86
0.750 ÷ 1.800	86 ÷ 87

Table 1.4.1.3 Hydro Power Plant Efficiency

The technology applied has been proven in other projects. VA TECH has trained staff of Trakia on operational issues. Further training needs are annually reviewed by Mr. Nasko Stoianof of Trakia. Maintenance is also performed by VA TECH.

1.4.2 SHPP Lesitchevo project activities

The company Delectra JSC constructed and operated with SHPP Lesitchevo. The company is owner of the hydro power plant.

The SHPP Lesitchevo is constructed as a by-pass spillway from the end of the main irrigation channel Momina Klisura – Lesitchevo at the Lesitchevo village on the Topolnitsa river with elevation difference of approximately 60 meters. The project for SHPP Lesitchevo includes the following main facilities:

- Pressure basin (water chamber). The pressure basin is constructed on the border between the end of the main irrigation channel and the spillway, as an extension at the left side of the channel. It provides the upper elevation /338.42 m/ of the operational water. Longitudinal wall, shaped as overfall, and the right half of the channel, outline an overfall trench, which outflows at the beginning of the spillway. The pressure basin provides the necessary water quantity to the SHPP;

- Two-parallel pressure pipelines begin from the intake section the pressure basin, and end in the SHPP building. The pressure pipelines are laid along the left side of the spillway and follows parallel with its course. The pipelines are burrowed in the ground, and the first (basic) section with length 784 m is constructed with pipes of fiberglass with diameter of 1,400 mm, and the second section with length approximately 20 m, just next to the building of the SHPP – is constructed with steel pipes with diameter 1,000 mm. The average longitudinal inclination of the pipeline is approximately 7.5%;

- The building of the SHPP with mechanical and electrical equipment, necessary for the power production and two lower channels for taking the outflow water to the Topolnitsa river. Two turbines on horizontal axis and all necessary equipment are installed in the SHPP building. See the picture in right;
- Existing spillway.

The energy potential of the project are estimated by the following elements:

- Water resource – water quantity and water volume, with which the turbine of the SHPP works and its internal annual distribution (energy usable volume). SHPP uses waters from Belmeken-Sestrimo cascade that can be approximately calculated through the power production of the HPP Momina Klisura and the specific water consumption of 1.72 m3/ kWh. The used waters from the HPP Momina Klisura, which works at peak load with maximum water quantity 56.6 m3/s, are about 500,000 m3 in the pressure basin. The water quantity that can be used in SHPP Lesitchevo, is about 3.20 m3/s for a turbine;

- Topographic (geodesic) resource – gross (geodesic) head and net head of the SHPP. The gross (geodesic) head of the HPP is estimated as elevation difference between the water level in the pressure basin – 338.45 m and water level in the outflow shaft (the outflow) of the HPP – 278.77 m and amounts to 59.65 m. The hydraulic losses in the pipeline are estimated, considering the fact that it is two-parallel. As a design net head (at Qmax = 3.20 m3/s for the turbine) is estimated the value 58.70 m.

- Energy indexes of the equipment – efficiency of the turbine, generator and transformer, in dependence of the working regime of the turbine of the SHPP (loading). The main technical characteristics have shown in the table below:

No.	Parameter	Dimension	Value
SHPP Lesitchevo Data			
1	Average built-up water flow	[m^3/s]	5.46
2	Annually processed water quantity	[$м^3$]	125,150,000
3	SHPP rated electrical power	[кW]	3,000
4	Annually availability at rated power	[h/y]	6,530
5	Annually electricity produced	[MWh/y]	16,300

Table 1.4.2.1 Main equipment technical characteristics

Turbines			
1	Type of the turbines	-	Horizontal type “Francis” FHS650F4PR650mm “Mavel” Czech production
2	Turbo units number	[pcs.]	2
3	Nozzles number	[pcs.]	-
4	Rated flow	[m³/s]	2.74
5	Maximal flow	[m³/s]	3.20
6	Minimal flow	[m³/s]	1.50
7	Head	[m]	57.8
8	Rated turbine revolutions	[rev./min]	750
9	Maximal turbine revolutions	[rev./min]	1,560
10	Impeller diameter	[mm]	650
Generators			
1	Generator type	-	Synchronous horizontal 1FC 711-8LT80 Siemens production
2	Generators number	[pcs.]	2
3	Rated voltage	[kV]	6.3
4	Frequency	[Hz]	50
5	Power factor cos f	-	0.8
6	Generator rated revolutions	[rev./min]	750
7	Rated full power	[kVA]	1,700
8	Cooling		IC01
9	Windings isolation class	-	F/F
Transformers			
	Transformer type	-	Two windings oil Type TM
	Transformers number	[pcs]	2
	Windings connection scheme	-	Dyn 11
	Rated voltage- second side	[kV]	20
	Rated voltage- first side	[kV]	6.3
	Frequency	[Hz]	50
	Rated power (standard)	[kVA]	1,600

Table 1.4.2.1 Main equipment technical characteristics - Continued

The energy characteristics of the equipment – efficiency and capacity of the three elements – turbine, generator and transformer, as well as the total efficiency of the system, at different values of the water quantity, are presented in the table below:

Water	Turbine		Generator		Transformer		Total
Quantity	Efficiency	Capacity	Efficiency	Capacity	Efficiency	Capacity	Efficiency
m^3/s	%	kW	%	kW	%	kW	%
3.20	87.9	1,593	95.9	1,527	98.5	1,505	83.0
3.00	88.9	1,510	95.9	1,448	98.5	1,427	84.0
2.73	89.2	1,379	95.9	1,322	98.5	1,303	84.3
2.50	78.0	662	94.8	628	98.5	619	72.8

Table 1.4.2.2 Energy characteristics of the main equipment

Staff of Delektra Hydro was trained by the supplier. Training needs are annually reviewed by the management of Delektra Hydro. Maintenance is performed by the company itself on a regular basis, at least once a year.

2. Methodology

The methodology used for the baseline and monitoring setting in the PDD is the approved baseline methodology AMS-I.D. “Grid connected renewable electricity generation”. The version that was in force at the time of PDD last version is AMS-I.D./Version 08/Scope 1/03 March 2006. Version 08 of the methodology was applicable for projects in the period from March to June 2006.
The following conditions for the methodology to be applicable are respected:

· the proposed two project activities apply to electricity capacity additions from run-of-river hydro power plants.

· generated electricity is supplied to an electricity national distribution system that is supplied by diverse fossil fuels (see Section A.4.4)

· the eligibility limit of 15 MWe per project is respected.

2.1. Implementation of the project

The project start of operation is shown in the table below:

Subproject	Tumrush SHPP	Lesitchevo SHPP	
		Unit 1	Unit 2
Start of operation	August.2005	January.2005	February.2006

Table 2.1.1 – Implementation of the project

The operational lifetime of each subproject is shown in the table below:

Subproject	Tumrush SHPP	Lesitchevo SHPP	
		Unit 1	Unit 2
Operational Lifetime	30 /thirty/ years	30 /thirty/ years	30 /thirty/ years

Table 2.1.2 – Operational Lifetime of the project

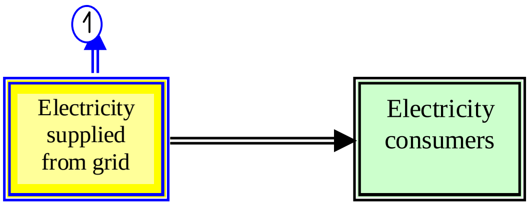
2.2. Intended deviations or revisions to the registered PDD

There are no deviations or revisions to the registered PDD.

2.3. Intended deviations or revisions to the registered Monitoring Plan

The project participants are encouraged to improve the monitoring process and its results.
Revisions, if any, to the monitoring plan to improve the accuracy and/or applicability of information collected shall be justified by project participants and shall be submitted for the determination referred to in paragraph 37 of the JI guidelines by the AIE. In this case the AIE shall determine whether the proposed revisions improve the accuracy and/or applicability of information collected, compared to the original monitoring plan without changing conformity with the relevant rules and regulations for the establishment of monitoring plans and, in case of a positive determination, shall proceed with the determination referred to in paragraph 37 of the JI guidelines (http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf).
There are no significant deviations or revisions to the registered MP. All changes that occur intend to ensure more clear and simple approach of data calculation and to show in transparent manner the algorithm of those calculations.

2.4. Flowchart of the situation before the implementation of the project



1 – CO_2 emissions (electricity from grid)

Figure 2.4.1 - Flowchart of situation before project implementation (baseline scenario)

2.5. Flowchart of the situation after the implementation of the project

2.5.1 Flowchart of the situation after the implementation of SHPP Tumrush project

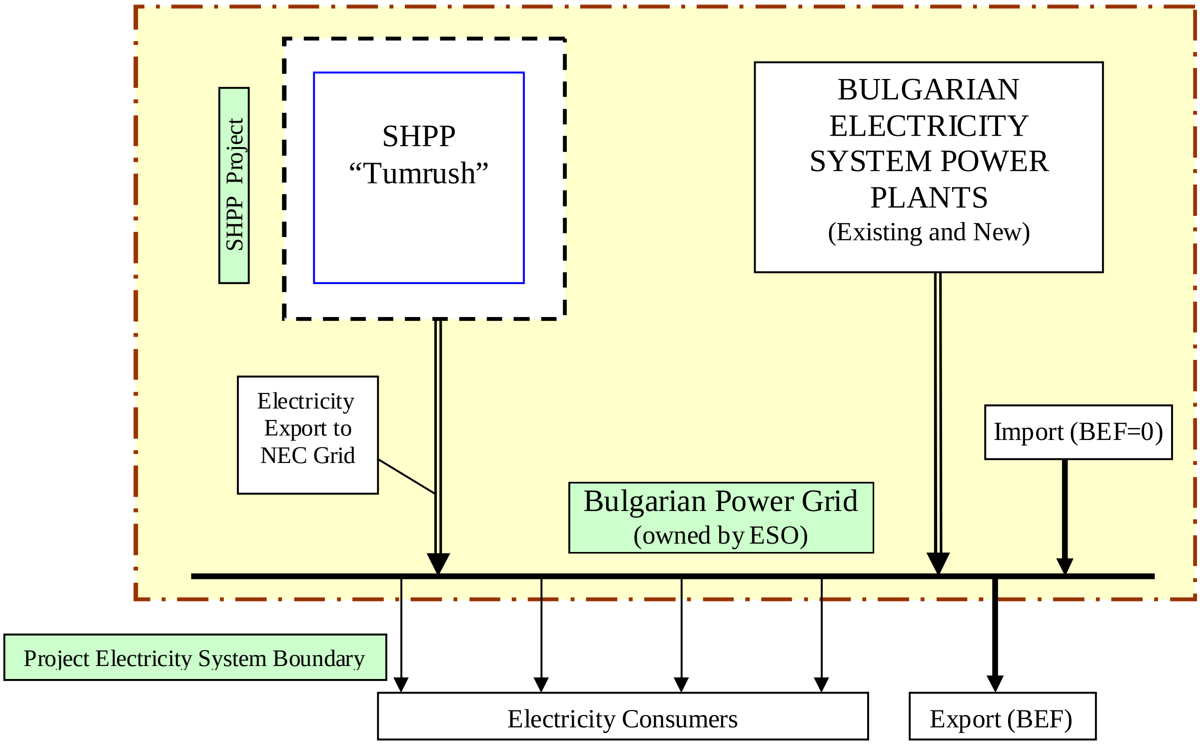


Figure 2.4.1.1 - System and Project Boundaries for SHPP Tumrush

2.5.2 Flowchart of the situation after the implementation of SHPP Lesitchevo project

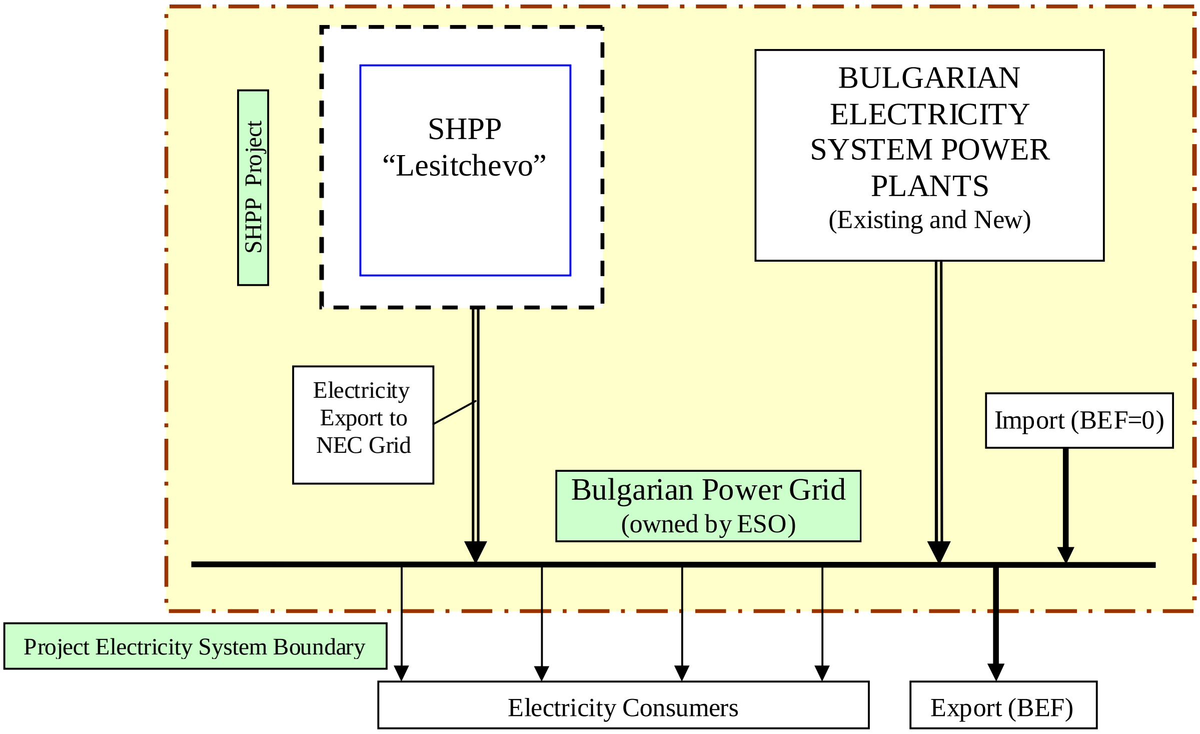


Figure 2.4.2.1 - System and Project Boundaries for SHPP Lesitchevo

2.5.3 Direct and indirect emissions

With this definition of the projects boundaries, the Project and Baseline emissions for the two SHPPs are as shown in Table 2.5.1 below:

Source		Gas	Included	*Justification/Explanation*
Baseline	CO2 emissions from electricity generation addition in fossil fuel fired power plants that are displaced due to the project activity	*CO_2*	***Yes***	***Main emissions source***
		CH_4	**No**	*Minor emissions source*
		N_2O	**No**	*Minor emissions source*
Project activity	CO2 emissions from the project operation	CO_2	**No**	*Minor emissions source*
		CH_4	**No**	*Not source of emissions*
		N_2O	**No**	*Not source of emissions*

Table 2.5.1 –Project and Baseline emissions

2.6. Estimation of the baseline emissions

The baseline scenario for the Project is the continuing operation of existing and future power plants in the Bulgarian EPS without taking into account the present Project.
In the project scenario, the current and future electricity demands of Bulgaria will be covered by the existing and future power plants including also the project electricity generation. The project scenario is expected to generate electricity in EPS of Bulgaria, based on hydropower energy source. The electricity produced by the project will displace electricity generation addition of existing local power plants burning fossil fuels, and will cover small part of the increased needs of EPS.
In order to estimate the importance of the project realisation upon the CO_2 emissions, the following estimation are prepared:

- estimation of the baseline CO_2 emissions scenario;
- Reduction of the CO_2 emissions as a result from the project realisation.

The quantity of CO_2 emissions should be expressed by multiplication of emission factor and corresponded energy production (electricity exported to the grid).

The baseline emission factors $BEF_{grid,y}$ used in the MP on project emissions reduction calculation are taken from the survey “Baseline Study of Joint Implementation projects in the Bulgarian energy sector” developed by NEK – EAD and officially published by MoEW. The survey was applied the ACM0002 Methodology and was executed at a request of Bulgarian Ministry of Environment and Waters (MoEW). The $BEF_{grid,y}$ values are reported for the historical period 2000 – 2004 and for the future period 2005 – 2012.
The findings for the future period are based on the official Least Cost Development Plan of the Bulgaria Power Sector, published in April 2004. NEK uses the software IRP Manager (Integrated Resource Planning Manager) for the purposes of the optimal planning of the power sector and the analysis of the demand side management. The methodology used for baseline determination had been developed based on merit order dispatch analysis. This type of approach is considered as most accurate way to analyse which unit will be replaced by a new capacity. The relation between operation margin and build margin is assumed as 50/50% for baseline carbon emission factor determination.
There is a current trend in baseline determination to eliminate the output of the nuclear and hydropower plants in the calculation of the operating margin emission factor. The reason is that the addition of new plants in the network will not affect their output due to their low operating costs.
The above mentioned baseline study considers two different scenarios for calculation of final dispatch data operating margin emission factor as function of annual electricity demand:

- by Maximum Power Demand Forecast (this scenario is chosen like more conservative);
- by Minimum Power Demand Forecast.

This methodology is officially approved by Ministry of Environment and Water and emission factors are updated and published annually. The Baseline Emission Factor used for the estimation of baseline emissions is presented in the following Table:

Baseline Emission Factor BEF_{grid}								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Maximum Power Demand Forecast	1.138	1.143	1.156	1.059	0.947	0.908	0.884	0.833

* Source: http://www.moew.government.bg/recent_doc/climate/Baseline%20CEF%20Summary.pdf
Table 2.5.1: Baseline emission factors of Bulgarian Electricity and Heat Power System

2.6.1 Estimation of SHPP Tumrush baseline emissions

The estimation of annual baseline CO_2 emissions – BE_{SHPP1} for SHPP Tumrush is given by:

$$\mathbf{BE_{SHPP1,y} = EG_{SHPP1,\,y} * BEF_{grid,y},} \quad \text{[tons } CO_2\text{]} \qquad \text{(2.5.1-1)}$$

Where:

$EG_{SHPP1,y}$ is the annual produced electricity, exported to grid for year **y**, in **MWh**,
$BEF_{grid,y}$ is is the baseline emission factor of the grid for year y, in **tCO_2/MWh.**

The results are presented in monitoring model – File "Monitoring SHPP Tumrush.xls".

2.6.2 Estimation of SHPP Lesitchevo baseline emissions

The estimation of annual baseline CO_2 emissions – BE_{SHPP1} for SHPP Lesitchevo is given by:

$$\mathbf{BE_{SHPP2,y} = EG_{SHPP2,\,y} * BEF_{grid,y},} \quad \text{[tons } CO_2\text{]} \qquad \text{(2.5.2-1)}$$

Where:

$EG_{SHPP2,y}$ is the annual produced electricity, exported to grid for year **y**, in **MWh**,
$BEF_{grid,y}$ is is the baseline emission factor of the grid for year y, in **tCO_2/MWh.**

The results are presented in monitoring model – File "Monitoring SHPP Lesitchevo.xls".

2.7. Estimation of the project and leakage emissions

Since the project comprises generation of electricity from renewable sources (hydropower) there is no project emissions as result of project activities, i.e.

$$\mathbf{PE_{SHPP1,y} = 0,} \quad \text{[tons } CO_2\text{]}$$
$$\mathbf{PE_{SHPP2,y} = 0,} \quad \text{[tons } CO_2\text{]}$$

At the other hand, as per AMS – I.D. project leakage emissions has to be considered only in cases if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, i.e.

$$\mathbf{LE_{SHPP1,y} = 0,} \quad \text{[tons } CO_2\text{]}$$
$$\mathbf{LE_{SHPP2,y} = 0,} \quad \text{[tons } CO_2\text{]}$$

2.8. Estimation of CO_2 emission reductions

2.8.1. Estimation of SHPP Tumrush CO_2 emission reductions

The difference between the baseline emissions and total project emissions represent the emission reduction from the project activity**:**

$$\mathbf{ER_{SHPP1,y} = BE_{SHPP1,y} - PE_{SHPP1,\,y} - LE_{SHPP1,\,y},} \quad \text{[tons } CO_2\text{]} \qquad \text{(2.7.1-1)}$$

The results are presented in monitoring model – File "Monitoring SHPP Tumrush.xls".

2.8.2. Estimation of SHPP Lesitchevo CO_2 emission reductions

The difference between the baseline emissions and total project emissions represent the emission reduction from the project activity**:**

$$ER_{SHPP2,y} = BE_{SHPP2,y} - PE_{SHPP2,\,y} - LE_{SHPP2,\,y}, \quad [tons\ CO_2] \qquad (2.7.2\text{-}1)$$

The results are presented in monitoring model – File “Monitoring SHPP Lesitchevo.xls”.

3. Monitoring

The project uses the approved monitoring methodology AMS-I.D “Renewable electricity generation for a grid” for the two subprojects SHPP Tumrush and SHPP Lesitchevo.
The chosen methodology AMS-I.D has designed for grid-connected renewable power generation project activities. The conditions for the methodology to be applicable have respected:

- The proposed two project activities apply to electricity capacity additions from run-of-river hydropower plants;
- Generated electricity is supplied to an electricity national distribution system that is supplied by diverse fossil fuels;
- The eligibility limit of 15 MW/y per subproject has respected.

Monitoring shall consist of metering the electricity generated by the renewable technology, in our case electricity generated from water turbines in the both hydropower stations.
The project participants are encouraged to improve the monitoring process and its results.

The implementation of the monitoring plan and its revisions, as applicable, shall be a condition for verification of project results in the crediting period.

3.1 Organization charts for data monitoring and reporting

The two small hydro power plants will have a similar structure to monitor the generated electricity. An electrical meter will monitor every kWh produced and delivered to the grid. The technical staff of the HHP and the responsible person of the local distribution company will both check the electricity produced. Monthly they will read the meter (day, night and peak kWh), and sign the monthly produced amount off in a special monthly monitoring protocol paper. The technical staff of the HHP holds a copy of this paper. Payments by the distribution company to the HHP have calculated, based on this protocol paper.
Responsible for monitoring the meters is the operational staff. Responsible for checking of the monitored data, supervising the monitoring and checking the calculations of emissions reductions are the Chief Power Engineer and the Plant Director.
The data has recorded in a logbook on a daily, weekly, monthly and yearly basis. The delivery and sales documentation copies will be stored for documentation too.
The organization charts of the two power plants have shown below:

3.1.1. Persons involved in data monitoring and reporting at SHPP Tumrush

The organization chart of the persons, involved in the monitoring process for SHPP Tumrush has presented below:

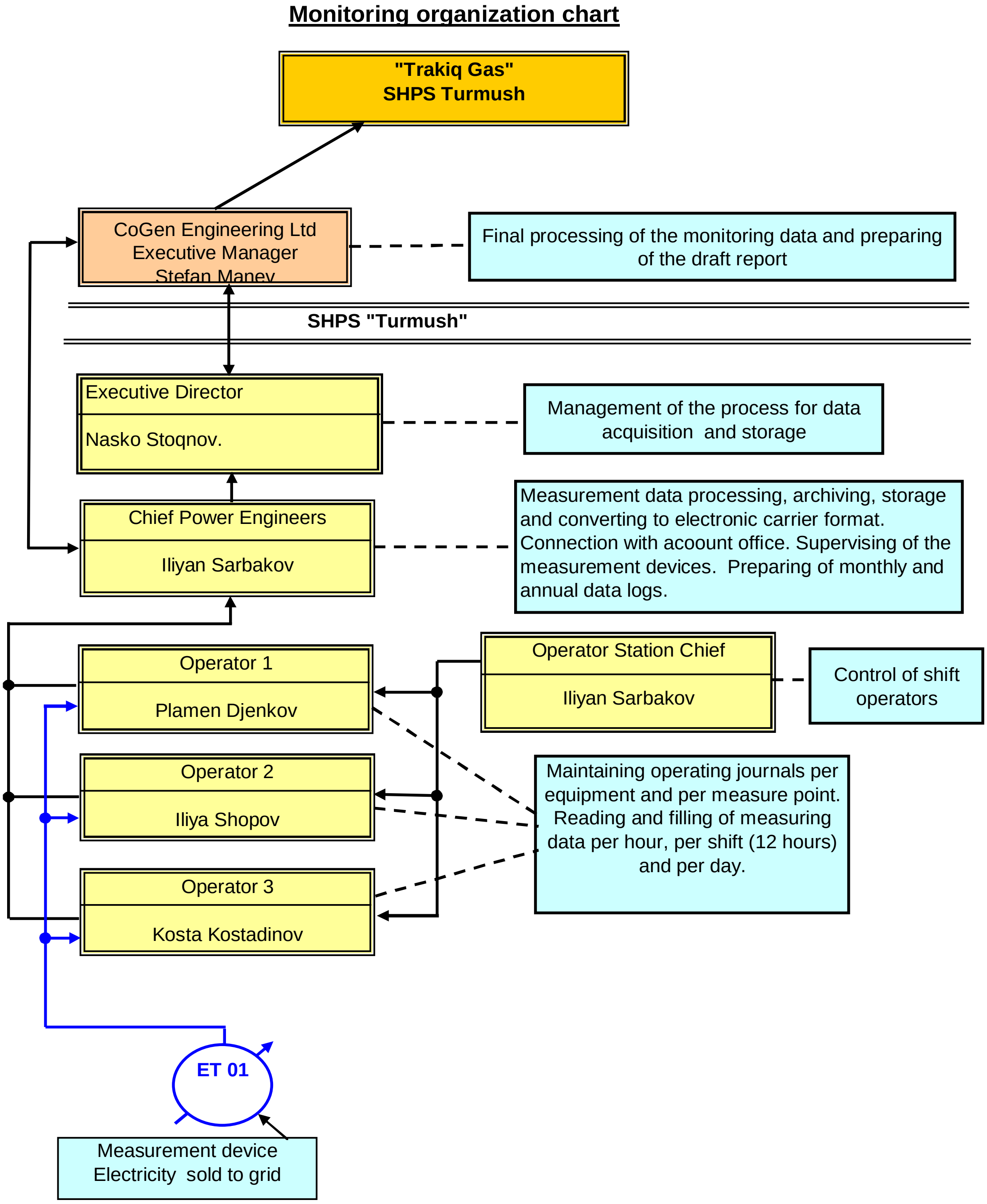


Fig. 3.1.1.1 SHPP Tumrush Monitoring Organization Chart

3.1.2. Persons involved in data monitoring and reporting at SHPP Lesitchevo

The organization chart of the persons, involved in the monitoring process for SHPP Lesitchevo is presented below:

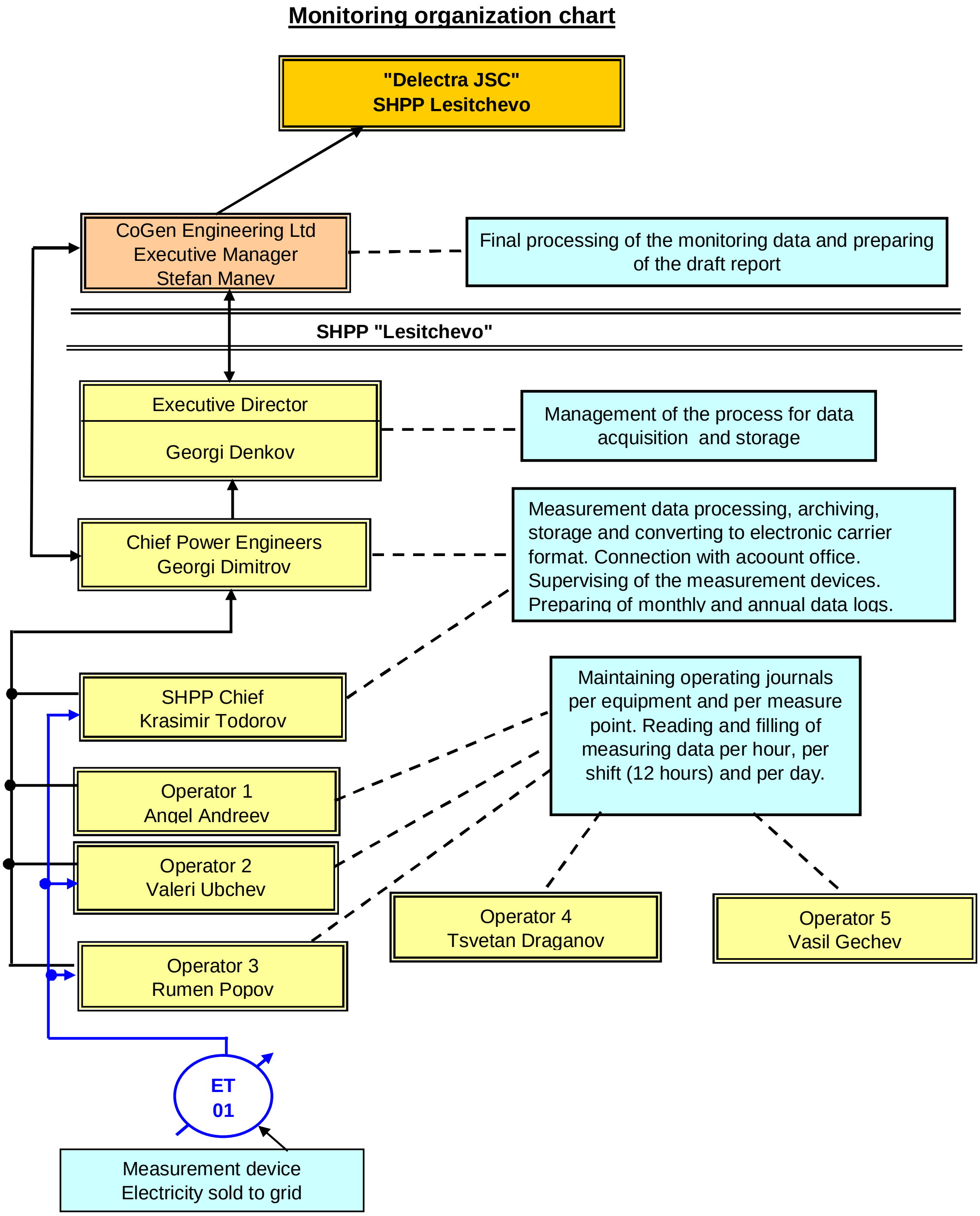


Fig. 3.1.2.1 SHPP Lesitchevo Monitoring Organization Chart

3.2 Key Monitoring activities and Data monitored

The structure and the procedures of monitoring in the period of project operation are:

Staff at subprojects

- Collecting and recording /electronically and in journal/ hourly and monthly the data from electro meters;
- Monthly to send to the Operator the data collected and copies from the purchasing protocols and invoices.

Staff at Operator

- The staff in charge of the monitoring shall fill the spreadsheets every month;
- To collect data from MOEW estimated and verificated grid BEF annually;
- To calculate using the existing monitoring model the emission reduction annually;
- To prepare annually Monitoring report and to send to the independent verification entity;
- To control the organization of the subprojects staff training every year;

The spreadsheets with the input data, calculations and results for the baseline and projects emissions have presented in Annex 1 to this document.
The data will be collected on a monthly basis during the crediting period (including 2013). The CO_2 emissions following the project implementation are determined from the parameters monitored, as described above. The monitoring plan describes the procedures for the collection of the data, and the procedures for the auditing required for the projects, in order to determine and verify emissions reductions achieved by the project. These projects will only require straightforward collection of data, described below.
Considering the project boundaries, the following data / parameters need to be monitored in order to estimate the project and baseline emissions, and the emissions reductions:

- $EG_{SHPP,i,y}$ - the electricity exported to the National Electrical Grid, in [MWhe];
- $EF_{grid,y}$ – baseline emission factor of the National Electrical Grid, in [tCO2/MWhe];

For the specific project considerations, a monitoring model has been designed. It is prepared in excel format in spreadsheets. With minimal changes, this model is applied to the two hydropower plants. The models automatically calculate baseline emissions and emissions reduction, for each year following project implementation, in a dynamic mode. The electronic worksheets serve as a data management and analysis system for the project managers and operators, and can be used throughout the lifetime of the project. The staff, responsible for Project monitoring, is required to complete the electronic worksheets on a monthly basis.

The Monitoring plan provides a complete compilation of the data that has to be collected for its correct application. This includes the data that are measured and data that are collected from other sources (e.g. official statistics, MOEW published data, IPCC 2006 data,). Data that is calculated with equations are not included in this compilation. The monitored data have shown in the table below:

	Data type	Data variable	Data unit	Measured (m), calculated (c) or Estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data archived? (electronic/paper)	How long will the archived data be stored?	Data Sources
1	Electricity exported to the grid	[Eg,y]	[MWhe]	m	Monthly	100%	Paper (field record) Computer (spreadsheet	Paper 2 years Computer 7 years after the last transfer of ERUs	Electrical Meter at Power Plant
2	CO_2 emissions factor for national electrical grid	[$BEF_{grid,y}$]	[tCO_2/MWh]	e	Yearly	100 %	Paper and electronicaly	Paper 2 years Computer 7 years after the last transfer of ERUs	Official MOEW and ESO publications

Table 3.2.1 - Data to be collected in order to monitor greenhouse gas emissions from the project activities, and how these data will be archived

3.3 Measurement schemes and measurement devices

The measurement schemes that are realized (measurement devices and the measurement points) for the data collecting in order to monitor the baseline emissions and estimation of the emissions reduction and short description of the measurement devices have given below:
Details for electrical meters, current and voltage transformers, calibration and test certificates and protocols for the both hydropower stations have shown in Annex 4 to this document.
In accordance to the Measurements Law, **Article** 39, the initial test of all measurement devices of approved type and these that are not necessary to be approved, has to be certified with special marks for passed initial test.
All measurement devices in both SHPPs are equipped with these marks for successfully conducted initial test. The next check tests have certified with special Ascertain Protocols attached in Annex 4 for the two stations.

3.3.1 Measurement scheme and measurement devices at SHPP Tumrush

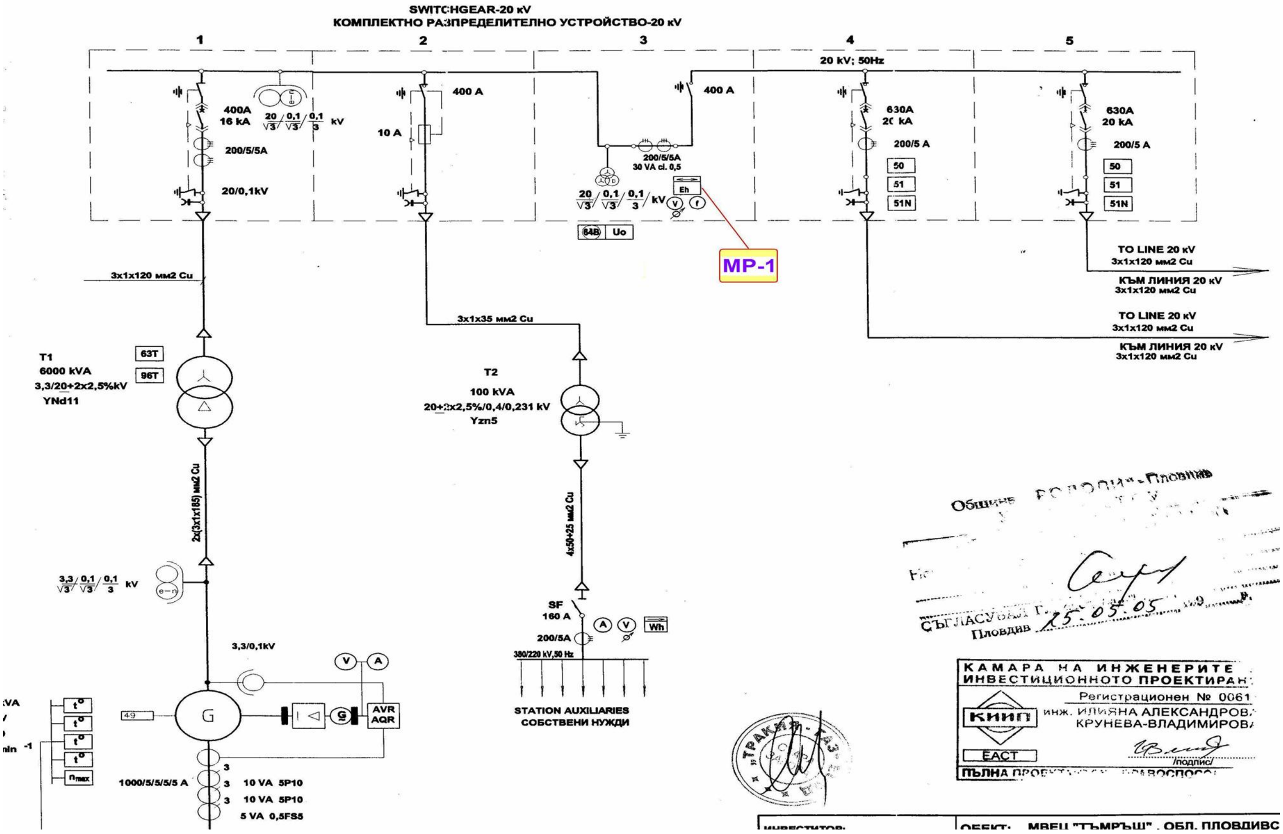


Fig. 3.3.1.1 - Measurement scheme at SHPP Tumrush

Position on the measurement scheme	Measured Parameter: Parameter	Measured Parameter: Dimens.	Measurement method	Measurement device model and Prod. No.	Measurement Quadrants and Period of measurements	Constant [imp/kWh]	Accuracy	Communication	Calibration protocols No./Date
MP-1	$EG_{SHPP1,y}$	[kWh]	Electronically Scheme with 3 transformers /3xCT +3x VT/	ZMD410CR4 4.2407.c3S2 Serial No. 85890517	4(+P,-P;+Q,-Q) 28.09.10	8,000	0.5 S	Optical, RS485,RS232	25638/28.09.2010 25639/28.09.2010
				ELSTER A 1500 Serial No. 00440222	4(+P,-P;+Q,-Q) From 13.07.2011	8,000	0.5 S	Optical, RS485,RS232	32669/13.07.2011 Ascertain Protocol 29983/11.07.2012
				ELSTER A 1500 Serial No. 00440227	4(+P,-P;+Q,-Q) From 13.06.2012	8,000	0.5 S	Optical, RS485,RS232	32689/13.06.2012
	Voltage transformers – 3pcs. – Merlin Gerin – Type VRM3NS3-Serial No.-0500030;0500031;0500032								
	Current transformers- 3pcs. – Merlin Gerin-Type ARM3N2F Ser.No.0461744; 0461745; 0461747–Test Pr.–17.12.2004								

Table 3.3.1.1 - Short measurement devices description SHPP Tumrush

3.3.2 Measurement scheme and measurement devices at SHPP Lesitchevo

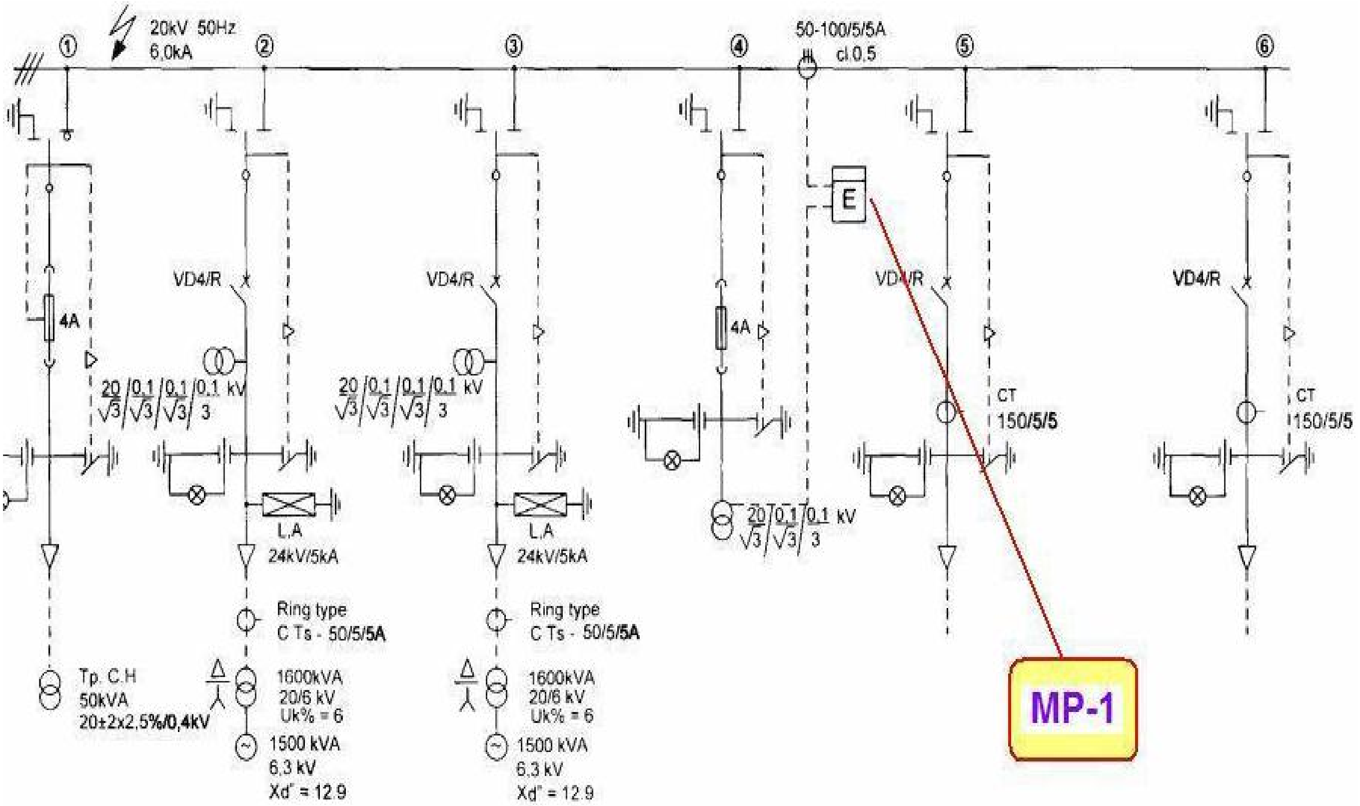


Fig. 3.3.2.1 - Measurement scheme at SHPP Lesitchevo

Position on the measur ement scheme	**Measured Parameter**			**Measure ment device model and Prod. No.**	**Measurement Quadrants and Period of measurements**	**Constant [imp/kWh]**	**Accu racy**	**Commun ica tion**	**Calibration protocols No./Date**
	Parameter	**Di mens.**							
			Measure ment method	ZMD410CR4 4.2407.c3S2 Serial No. 85890526	4(+P,-P;+Q,-Q) From 08.09.10 to 09.08.2011	4,000	0.5 S	Optical, RS485,RS2 32	24091/08.09.2010 Dismantling Pr. 33537/09.08.2011
				ELSTER A 1500 Serial No. 00440226	4(+P,-P;+Q,-Q) From 09.08.2011	4,000	0.5 S	Optical, RS485,RS2 32	33538/09.08.2011 33540/11.08.2011
	Voltage transformers – 3pcs. – ABB EJF – Type TDC 6 20/01								
	Current transformers- 3pcs. RITZ SNo 08130455 666/674/633 100/5 A – from 09.08.2011 -Pr. No.33537								

Table 3.3.2.1 - Short measurement devices description SHPP Lesitchevo

3.4. QA/QC Procedures

Principally all procedures for the Quality Control and Quality Assurance of the measurements are presented in the legislation documents (norms and standards) as follow:

1. Measurement Law – S.G., issue No 39 /20.05.2011 year.
2. Regulation for ordering of the competent persons how to verify measurement devices, which are under metrological control – GD N31 /12.03.2003 year;Amend. SG 40/16.05.2006.
3. SAMTS (State Agency for Metrology and Technical Surveillance) order N A-102/05.03.2010 for the periodical testing of measurement devices, which are subject of metrological control.

The procedures for installation and maintenance of the measuring devices are outlined in details at the Operation Manuals supplied with each device. The producers are also obliged in accordance with the international practice and the Bulgarian legislation to perform supervision control in the process of installation, so and to commissioning in operation of the measurement devices.
The measurement devices (electrical meters) are EVN's (like electricity purchaser) property and all procedures connected with their initial and periodical calibration, so and correct operation, are EVN obligations. The QA/QC procedures are developed form company EVN in their quality system ISO 9001.
The procedure in case of measurement device damage or data incorrectness is normally subject of temporally or continiously changing of the device from EVN side with new one.
A protocol is prepared in case the meter fails. In case of technical failures, an agreement has reached in each project plant that historic data should be used to calculate the produced electricity, up to the moment of the device changing.
The data will be recorded in a logbook on a daily, weekly, monthly and yearly basis.
All operational staff has annual training schemes, which include training on monitoring issues. The schemes are updated and reviewed each year. The persons, mentioned above in points 3.1.1 and 3.1.2, are responsible for adequate knowledge of the staff for monitoring and updating their knowledge through training. Annually, the staff's knowledge is tested. Procedures for testing and training are laid down like a part of Training Program for safety operation.

Question/Issue	Action to be taken
Is data recorded within the usual measurement range?	Yes
Have there been any equipment malfunctions?	No
Equipment calibration	Yes, with initial marks and Ascertain Protocols
Has data been backed up electronically and on paper?	Yes the measurement data are storage electronicaly and on paper.
Data completeness?	Tha data are with fully completenes.

Table 3.4.1 Data quality checklist of SHPP Tumrush

Question/Issue	Action to be taken
Is data recorded within the usual measurement range?	Yes
Have there been any equipment malfunctions?	No
Equipment calibration	Yes, with initial marks and Ascertain Protocols
Has data been backed up electronically and on paper?	Yes the measurement data are storage electronicaly and on paper.
Data completeness?	Tha data are with fully completenes.

Table 3.4.2 Data quality checklist of SHPP Lesitchevo

4. Measurement data July 2011 – October 2012 collection

The measurement data are collected from the measurement devices outlined above in accordance with the Monitoring plan, monthly for the period from 01.07.2011 to 31.10.2011 for SHPP Lesitchevo and SHPP Tumrush. The data are filled in the tables of the Monitoring model in Excel format and are the base for automatically calculations of the baseline emissions and the emissions reduction.
The data collected are shown in the input tables below:

4.1 Measurement data July 2011- October 2012 collection at SHPP Tumrush

Exported Electricity to Grid

Month	2005	2006	2007	2008	2009	2010	-> 06.2011	07.2011->	-> 10.2012
Jan	0.000	2,125.128	578.376	1,181.280	160.184	584.504	427.312	0.000	210.657
Feb	0.000	1,409.704	1,404.336	1,361.752	723.632	1,360.512	234.872	0.000	633.830
Mar	0.000	3,085.176	1,865.560	3,021.384	900.168	2,784.896	662.688	0.000	2,129.190
Apr	0.000	3,287.128	2,412.368	2,461.320	2,454.632	3,230.200	1,598.304	0.000	3,522.839
May	0.000	1,982.552	1,237.256	2,473.400	2,306.520	1,896.560	2,228.264	0.000	3,220.803
Jun	0.000	1,130.136	3,018.064	1,496.896	581.312	1,288.080	1,526.544	0.000	2,254.561
Jul	0.000	1,604.320	480.616	230.888	649.760	1,223.880	0.000	336.680	401.662
Aug	1,922.560	409.776	337.896	158.864	66.760	605.560	0.000	246.340	87.727
Sep	1,133.200	116.480	156.512	0.000	259.648	132.736	0.000	55.368	44.752
Oct	1,477.632	357.032	69.872	140.544	155.440	322.064	0.000	711.165	35.000
Nov	1,119.304	483.864	810.272	0.000	268.800	267.032	0.000	199.989	0.000
Dec	1,411.872	329.672	1,614.992	85.816	645.888	411.416	0.000	173.573	0.000
Total	**7,064.568**	**16,320.968**	**13,986.120**	**12,612.144**	**9,172.744**	**14,107.440**	**6,677.984**	**1,723.114**	**12,541.021**

Table 4.1.1 Measurement data 2005 – 2012 SHPP Tumrush

4.2 Measurement data February 2005- May 2011 collection at SHPP Lesitchevo

Exported Electricity to Grid

Month	2005	2006	2007	2008	2009	2010	-> 06.2011	07.2011->	-> 10.2012
Jan	0.000	1,611.250	468.436	687.072	363.292	2,130.156	2,154.476	0.000	362.115
Feb	1,608.332	1,821.032	120.420	659.328	357.968	1,793.796	1,657.196	0.000	842.365
Mar	1,094.796	862.040	389.672	1,478.792	1,446.576	1,546.340	935.008	0.000	134.920
Apr	827.292	2,025.664	981.968	1,488.472	1,991.612	1,738.968	684.808	0.000	548.757
May	1,059.820	1,559.416	1,992.496	1,865.264	1,713.232	2,170.292	1,073.568	0.000	1,795.951
Jun	1,046.762	1,905.420	1,871.896	1,745.412	1,637.364	2,069.020	761.980	0.000	1,620.461
Jul	898.462	994.800	1,202.268	1,417.072	1,929.356	2,000.728	0.000	1,002.076	366.896
Aug	99.894	1,509.112	1,946.000	1,919.572	1,904.448	1,467.564	0.000	1,372.893	869.268
Sep	0.000	1,773.756	1,355.604	1,076.884	555.700	299.192	0.000	810.004	513.680
Oct	0.000	1,544.928	1,374.832	215.324	1,177.456	1,907.512	0.000	387.791	554.512
Nov	784.226	1,070.472	1,441.652	275.368	1,419.952	776.100	0.000	799.156	0.000
Dec	1,051.680	1,108.488	1,299.964	162.512	1,635.416	2,480.436	0.000	633.591	0.000
Total	**8,471.264**	**17,786.378**	**14,445.208**	**12,991.072**	**16,132.372**	**20,380.104**	**7,267.036**	**5,005.511**	**7,608.924**

Table 4.2.1 Measurement data 2005 – 2012 SHPP Lesitchevo

5. Calculations

The calculations of the emissions and the emissions reduction in the Monitoring model are performance automatically using the formulas outlined in point 2 of the Monitoring report and PDD.

5.1 Baseline emissions calculation

The calculations are based on formulas in point 2.6 above.

5.1.1 Baseline emissions calculation SHPP Tumrush

Year	EGshpp,i,y	BEFgrid,y	BEshpp,i,y
	[MWhe]	[tCO2/MWhe]	[tCO_2 /y]
2005	7,064.57	1.138	8,039.48
2006	16,320.97	1.143	18,654.87
2007	13,986.12	1.156	16,167.95
Total BE for the period	**37,371.66**		**42,862.30**
2008	12,612.14	1.059	13,356.26
2009	9,172.74	0.947	8,686.59
2010	14,107.44	0.908	12,809.56
-> 06.2011	6,677.98	0.884	5,903.34
07.2011->	1,723.11	0.884	1,523.23
-> 10.2012	12,541.02	0.833	10,446.67
Total BE for the period	**56,834.45**		**52,725.65**
2013	0.00	0.000	0.00
2014	0.00	0.000	0.00
2015	0.00	0.000	0.00
2016	0.00	0.000	0.00
2017	0.00	0.000	0.00
2018	0.00	0.000	0.00
2019	0.00	0.000	0.00
2020	0.00	0.000	0.00
Total BE for the period	**0.00**		**0.00**
Total	**94,206.10**		**95,587.95**

Table 5.1.1.1 Baseline emissions 2005 – 2012 SHPP Tumrush

5.1.2 Baseline emissions calculation SHPP Lesitchevo

Year	EGshpp,i,y	BEFgrid,y	BEshpp,i,y
	[MWhe]	[tCO2/MWhe]	[tCO2 /y]
2005	8,471.26	1.138	9,640.30
2006	17,786.38	1.143	20,329.83
2007	14,445.21	1.156	16,698.66
Total BE for the period	**40,702.85**		**46,668.79**
2008	12,991.07	1.059	13,757.55
2009	16,132.37	0.947	15,277.36
2010	20,380.10	0.908	18,505.13
-> 06.2011	7,267.04	0.884	6,424.06
07.2011->	5,005.51	0.884	4,424.87
-> 10.2012	7,608.92	0.833	6,338.23
Total BE for the period	**69,385.02**		**64,727.20**
2013	0.00	0.000	0.00
2014	0.00	0.000	0.00
2015	0.00	0.000	0.00
2016	0.00	0.000	0.00
2017	0.00	0.000	0.00
2018	0.00	0.000	0.00
2019	0.00	0.000	0.00
2020	0.00	0.000	0.00
Total BE for the period	**0.00**		**0.00**
Total	**110,087.87**		**111,395.99**

Table 5.1.2.1 – Baseline emissions 2005-2012 SHPP Lesitchevo

5.2 Project emissions and Leakages calculations

In accordance with point 2.7:
The Project emissions of the two SHPPs are:

$$\mathbf{PE_{SHPP1,y} = 0, \quad [tons\ CO_2]}$$
$$\mathbf{PE_{SHPP2,y} = 0, \quad [tons\ CO_2]}$$

The leakages of the two SHPPs are:

$$\mathbf{LE_{SHPP1,y} = 0, \quad [tons\ CO_2]}$$
$$\mathbf{LE_{SHPP2,y} = 0, \quad [tons\ CO_2]}$$

5.3 Emissions reduction calculations

The calculations are based on the formulas in point 2.8.

5.3.1 Emissions reduction calculations SHPP Tumrush

Year	BEshpp,i,y	PEy	LEy	ERy
	[tCO2 /y]	[tCO2 /y]	[tCO2 /y]	[tCO2 /y]
2005	8,039.48	0.00	0.00	8,039.48
2006	18,654.87	0.00	0.00	18,654.87
2007	16,167.95	0.00	0.00	16,167.95
Total AAUs for the period	**42,862.30**	**0.00**	**0.00**	**42,862.30**
2008	13,356.26	0.00	0.00	13,356.26
2009	8,686.59	0.00	0.00	8,686.59
2010	12,809.56	0.00	0.00	12,809.56
-> 06.2011	5,903.34	0.00	0.00	5,903.34
07.2011->	1,523.23	0.00	0.00	1,523.23
-> 10.2012	10,446.67	0.00	0.00	10,446.67
Total ERUs for the period	**52,725.65**	**0.00**	**0.00**	**52,725.65**
2013	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00
2018	0.00	0.00	0.00	0.00
2019	0.00	0.00	0.00	0.00
2020	0.00	0.00	0.00	0.00
Total for the period	**0.00**	**0.00**	**0.00**	**0.00**
Total	**95,587.95**	**0.00**	**0.00**	**95,587.95**

, WHERE:

Total ERUs for the period from 07.2011 to 10.212	**11,969.90**	**0.00**	**0.00**	**11,969.90**

Table 5.3.1.1 – Emissions recuction 2005-2012 SHPP Tumpush

5.3.2 Emissions reduction calculations SHPP Lesitchevo

Year	BEshpp,i,y	PEy	LEy	ERy
	[tCO_2 /y]	[tCO_2 /y]	[tCO_2 /y]	[tCO_2 /y]
2005	9,640.30	0.00	0.00	9,640.30
2006	20,329.83	0.00	0.00	20,329.83
2007	16,698.66	0.00	0.00	16,698.66
Total AAUs for the period	**46,668.79**	**0.00**	**0.00**	**46,668.79**
2008	13,757.55	0.00	0.00	13,757.55
2009	15,277.36	0.00	0.00	15,277.36
2010	18,505.13	0.00	0.00	18,505.13
-> 06.2011	6,424.06	0.00	0.00	6,424.06
07.2011->	4,424.87	0.00	0.00	4,424.87
-> 10.2012	6,338.23	0.00	0.00	6,338.23
Total ERUs for the period	**64,727.20**	**0.00**	**0.00**	**64,727.20**
2013	0.00	0.00	0.00	0.00
2014	0.00	0.00	0.00	0.00
2015	0.00	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00
2018	0.00	0.00	0.00	0.00
2019	0.00	0.00	0.00	0.00
2020	0.00	0.00	0.00	0.00
Total for the period	0.00	0.00	0.00	0.00
Total	**111,395.99**	**0.00**	**0.00**	**111,395.99**

, WHERE:

Total ERUs for the period from 07.2011 to 10.212	**10,763.11**	**0.00**	**0.00**	**10,763.11**

Table 5.3.2.1 – Emissions reduction 2005-2012 SHPP Lesitchevo

5.3.3 Total emissions reduction calculations for the project

Total Emissions Reduction for SHPP Tumrush and SHPP Lesitchevo

Year	SHPP Tumrush Emissions Reduction	SHPP Lesitchevo Emissions Reduction	Total Emissions Reduction
	[tCO_2 /y]	[tCO_2 /y]	[tCO_2 /y]
2005	8,039.48	9,640.30	17,679.78
2006	18,654.87	20,329.83	38,984.70
2007	16,167.95	16,698.66	32,866.62
Total AAUs for the period	**42,862.30**	**46,668.79**	**89,531.09**
2008	13,356.26	13,757.55	27,113.81
2009	8,686.59	15,277.36	23,963.94
2010	12,809.56	18,505.13	31,314.69
-> 06.2011	5,903.34	6,424.06	12,327.40
07.2011->	1,523.23	4,424.87	5,948.10
-> 10.2012	10,446.67	6,338.23	16,784.90
Total ERUs for the period	**52,725.65**	**64,727.20**	**117,452.85**
2013	0.00	0.00	0.00
2014	0.00	0.00	0.00
2015	0.00	0.00	0.00
2016	0.00	0.00	0.00
2017	0.00	0.00	0.00
2018	0.00	0.00	0.00
2019	0.00	0.00	0.00
2020	0.00	0.00	0.00
Total for the period	0.00	0.00	0.00
Total	**95,587.95**	**111,395.99**	**206,983.94**

, WHERE:

Total ERUs for the period from 07.2011 to 10.2012	**11,969.90**	**10,763.11**	**22,733.01**

Table 5.3.3.1 – Emissions reduction 2005-2012 SHPP Tumrush and SHPP Lesitchevo

The calculations files are attached in Annex No.1 to the Monitoring Report.