MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	SELIMOGLU 9.33 MW HYDROELECTRIC POWER PLANT
Reference number of the project activity	GS635
Version number of the monitoring report	6
Completion date of the monitoring report	13/02/2013
Registration date of the project activity	02/02/2011
Monitoring period number and duration of this monitoring period	30 months 07/01/2010 -30/06/2012.
Project participant(s)	Arsin Enerji Elektrik Üretim Sanayi Ticaret A.Ş. Global Tan Energy Ltd.
Host Party(ies)	Turkey
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope 1 "Energy Industry – Renewable Sources " Applied methodology: ACM0002,Version 9.
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	44,885 tons of CO_2 for 30 months period 17,954 tons CO_2 yearly.
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	39,355tons CO_2e for 30 months period 14,543 tons CO_2e in 2010 14,541 tons CO_2e in 2011 10,271tons CO_2e in 2012 (Jan 2012-June 2012)

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

This monitoring report has been prepared in order to document the emission reduction achieved by implementation of Selimoglu Hydroelectric Power Plant (SELIMOGLU) and impact of the Project on sustainable development. The monitoring report is based on Gold Standard principles and involves impact of project on Sustainable Development Indicators in addition to emission reduction calculations.

The electricity generation license (EU/1069-1/787) for the project has been awarded to Hidro Kontrol Elektrik Üretim Sanayi A.Ş. by the Turkish Energy Market Regulatory Authority on 25/01/2007. This licence has been amended on 04/05/2011 with the project owner's name changed as Arsın Enerji Elektirk Üretim Sanayi A.Ş. This amendment has been indicated under Sections A.3 and B.2.3.

The water intake of the weir is from the left shore of the weir. The water is transmitted to Selimoglu HEPP powerhouse, located at 120 metres, through a 42 metres long 3.2m width and 2.37 height rectangular conveyance channel and a 2,748 meters long 312 meters diameter channel and a second channel between tunnel and loading pool having a length of 32 m, width of 3.2m and height of 2.37m. Penstock has a length of 140m and diameter of 1.7 meter. The elevation difference is about 100m. Two horizontal axis Francis turbines are used at the power house.

The installed capacity of the Selimoglu power plant power plant is 9.33MWm/8.8 MWe. Average yearly flow at the weir location is 4.82 m^3/sec. Maximum flow to the HEPP after the optimization studies is
10.25 m^3/sec. The annual estimated electricity generation is 31.97 GWh, of which 7.36 GWh is firm energy. The yearly expected carbon emission reduction of Selimoğlu HEPP, based on 2007 Turkish Electrical Statistical Tables, is around 17,954 tons of CO_2.

Hydroelectric power plants are structures that generate electricity utilizing the energy of flowing water. The project consists of three Francis type turbines and three generators which are used to transform the potential energy of water to mechanical energy at the initial stage and later into electrical energy.

Environmental and social measures identified in the feasibility report and pre-EIA have been applied for the proposed project and details have been defined in Gold Standard Passport document. The studied literature results show however defined, that the external costs of hydro power, which we know are much lower than those of fossil thermally generated electricity and alternative electricity generation systems including renewable. Studies given below shows that the external costs of Run-off-River type HEPPS are lower than wind and solar power plants[1'] and have better performance compared to other main electricity generation sources[2].

Net electricity generation during monitoring period has been calculated as 70,054.246 MWh ,and net emission reduction is 39,355tons CO_2

[1] http://www.swv.ch/de/argumentarium_i_mehr.cfm#lokale_umweltauswirkungen
[2] http://lrs.epfl.ch/webdav/site/lrs/shared/Document/hirschberg1.pdf (Figure 6)

Milestone	Date
License Issuance	25/01/2007
Carbon Certification Decision	25/05/2007
Equipment Purchase Agreement	11/07/2007
Carbon Certification Agreement	03/07/2008
EIA Exemption Letter	23/09/2008
LSC Meeting	28/11/2008
Start of Construction	10/12/2008
Loan Agreement	04/06/2009
Updated Water Right Utilization Agreement	15/06/2009
System Connection Approval	31/08/2009
Commissioning Date	07/01/2010
Start of Crediting Period	07/01/2010

Table 1. Selimoglu HEPP Project Milestones

Project has been implemented in line with the registered GS documents and monitoring plan

A.2. Location of project activity

Host Party	Turkey
Region/State/Province	East Black Sea Region, Trabzon Province
City/Town/Community	Arsin District, Fındıklı Village.
Physical/Geographical location	The weir is located at 500 meters northwest of the village of Oguzzane, at 220 meters elevation; powerhouse is located at 1200 meters east of Fındıklı County, at 120 meters elevation

Table2. Project location

Coordinates of the project elements are given below;

	Longitude	Latitude
Selimoglu Weir	E 39°56'28.86"	N 40°51'24.84"
Powerhouse	E 39°58'14.76"	N 40°52'12.25"

Table 3. Coordinates of weirs and powerhouse

Figure 1. Selimoglu HEPP project location

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (Host)*	Arsin Enerji Elektrik Üretim Sanayi Ticaret A.Ş. Global Tan Energy Ltd.	No

A.4. Reference of applied methodology

The United Nations approved consolidated baseline methodology applicable to this project is ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", Version 9[3].

ACM0002 refers to the following tools:

- "Tool for the demonstration and assessment of additionality", Version 05.2, [4]and
- ''Tool to calculate the emission factor for an electricity system'', Version 01.1[5]

[3] http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_YOYKBRCBIK7TSPSB7MQT75SPX75PE8
[4] http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf
[5] See: http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf

A.5. Crediting period of project activity

Project uses renewable crediting period. Crediting period of the project is 7 years between 07/01/2010 and 06/01/2017. Project has been commissioned on 07/01/2010 however no change in start date has been made.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

The Selimoğlu HEPP has been developed by Hidro Kontrol Elektrik Üretim Sanayi A.Ş. It is a run-off- river type project. Selimoglu Weir is located at the Northeast of Turkey, in the province of Trabzon, within the borders of district of Arsin, 500 meters northwest of the village of Oguzzane, on the Yanbolu Creek.

Project has started operation in 07/01/2010. There is only one project site as defined above.

Technical characteristics of Selimoğlu HEPP have been summarized in table below.

Total installed capacity		: 9.33 MWm/8.8MWe
Number of units		: 2
1.	Capacity of units	: 2 x 4.667 MWm/4.4MWe
2.	Type of Weirs	: Concrete
3.	Type of turbine	: Horizontal Francis
4.	Type of generators	: Horizontal Synchronized, 50 Hz
5.		750 rpm
6.	Generator Capacity	: 5,030kVA
Gross Head		: 100.55 m
Design Flow Rate		: 10.25 m^3/s
7.	Synchronous speed of generators	: 1000 rpm
8.	Penstock Length	: 140 m
9.	Efficiency of generators	: 0.9

Table 4: Characteristics of the project[6]

During the first monitoring period, project has generated less electricity then expected due to low rate of flow. In second operation period, the generation has been close to estimated figures. No event or situation that may prevent applicability of methodology has occurred during the monitoring period.

Main goals of the project include:

- Utilize the hydrolelectric potential of Turkey to meet the increasing electricity demand
- Increase the share of run-of-river power plants in the electricity generation mix of Turkey,

[6] FSR Section 1

reducing dependency on imported fossil fuel and thereby reducing the GHG emission.
- Wider use of distributed energy generation systems which help to decrease the transmission loss in the grid and aids system stability,
- Contribute to the economic development by creating direct and indirect job oppurtunities.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

To calculate project emission from diesel generator, counter records have been used. However, to crosscheck, There are no fuel invoices.

B.2.2. Corrections

No correction has been made

B.2.3. Permanent changes from registered monitoring plan or applied methodology

Since TEIAS has started remote reading, instead of monthly generation signed by both parties, OSF forms have been used to monitor the generation from the plant. Those forms have been compared with the "Balancing/Dengeleme" records that form the basis for PMUM records for consistency and accuracy.

The electricity generation license (EU/1069-1/787) for the project has been awarded to Hidro Kontrol Elektrik Üretim Sanayi A.Ş. by the Turkish Energy Market Regulatory Authority on 25/01/2007. This licence has been amended on 04/05/2011 with the project owner's name changed as Arsın Enerji Elektirk Üretim Sanayi A.Ş. This amendment has been indicated under Sections A.3 and B.2.3.

B.2.4. Changes to project design of registered project activity

No change on project design has been made.

B.2.5. Changes to start date of crediting period

Expected crediting period was indicated as 01/01/2010 in the PDD. Crediting period has been changed to 07/01/2010 which is commissioning date.

B.2.6. Types of changes specific to afforestation or reforestation project activity

N/A

SECTION C. Description of monitoring system

Monitoring is a key procedure to verify the real and measurable emission reductions from the proposed project. To guarantee the proposed project's real, measurable and long-term GHG emission reductions, the monitoring plan is established. Project has been registered as a GS-VER project. In addition to the parameters monitored in PDD, there exist sustainable development indicators as given in GS passport document.

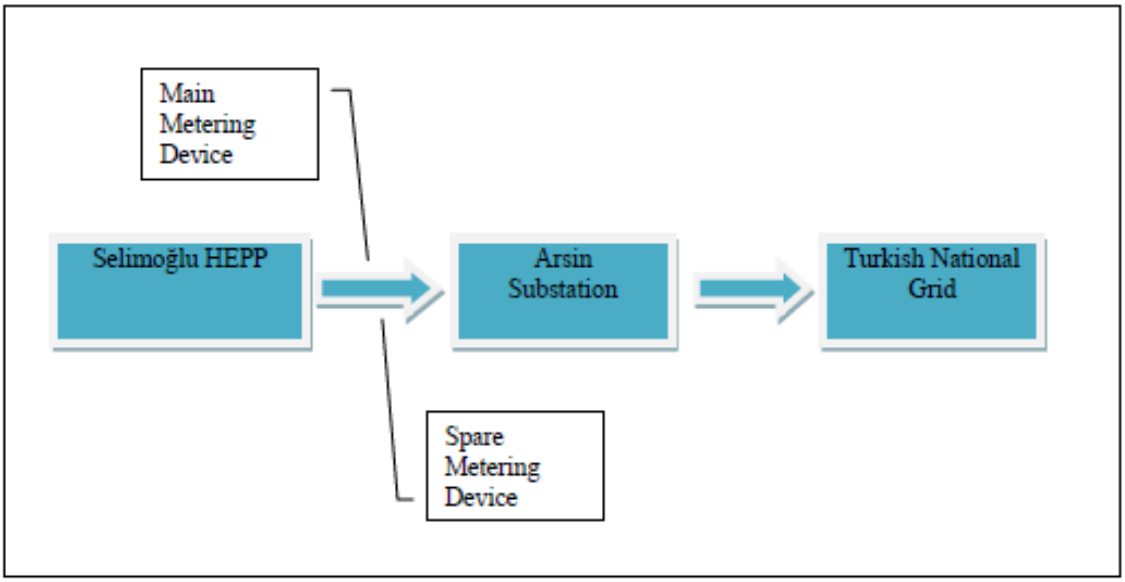
In order to demonstrate the emission reduction, only the required data is the net electricity delivered to the grid by the project activity and internal combustion for the auxiliary diesel generator. Data for the carbon content of the diesel fuel has been calculated from TEIAS web page. Moreover, the working hours of diesel generator are recorded by project owner and it is crosschecked by using value from screen of diesel generator.

Electricity fed to to the grid and electricity consumed have been measured and recorded by both TEIAS. Data collected during crediting period has been submitted to GTE who is be responsible for calculating the emission reduction subject to verification. Generation data was used to prepare monitoring reports which is used to determine the vintage from the project activity. These reports were submitted to the duly authorized and appointed Designated Operational Entity, DOE before each verification period.

VER Team Members include;

Plant Manager: Overall responsibility of compliance with VER monitoring plan
Electrical Engineer: Responsible for day to day running of plant, recording and monitoring of relevant data and periodic reporting
Accounting Manager: Responsible for keeping data about power sales, invoicing and purchasing. Global
Tan Energy: Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

Installation of meter and data monitoring were carried out according to the regulations by TEIAS. Two metering devices (one of them used as spare) were used for monitoring the electricity generated by the power plant. Readings were done using main metering devices and spare metering device were used for comparison only. Data from metering devices were recorded by TEIAS monthly and remotely. In addition to the two metering devices, generation of the HEPP can be cross checked from TEIAS – PMUM [7] web site (http://pmum.teias.gov.tr) which is accessible using a password provided to electricity generation companies.



[7] PMUM: Market Financial Settlement Center, operator of Turkish Electricity Market controlled by Turkish Electricity Transmission Company(TEIAS)

Figure 2. Selimoğlu HEPP Meters and Connection Diagram

ISVM (Electricity fed to the grid)and UECM(Electricity consumed from the grid) data given in PMUM records will be used for crosschecking of emission reduction calculations.

The lake area at the maximum height has been defined in the project documents. Although it is not possible to exceed maximum lake area, as the excess water can spill over the weir, the water level and maps of reservoir area were used to monitor the maximum area covered.

The monitoring system organization chart is shown in Figure below, in which the authority and responsibility of project management are defined.

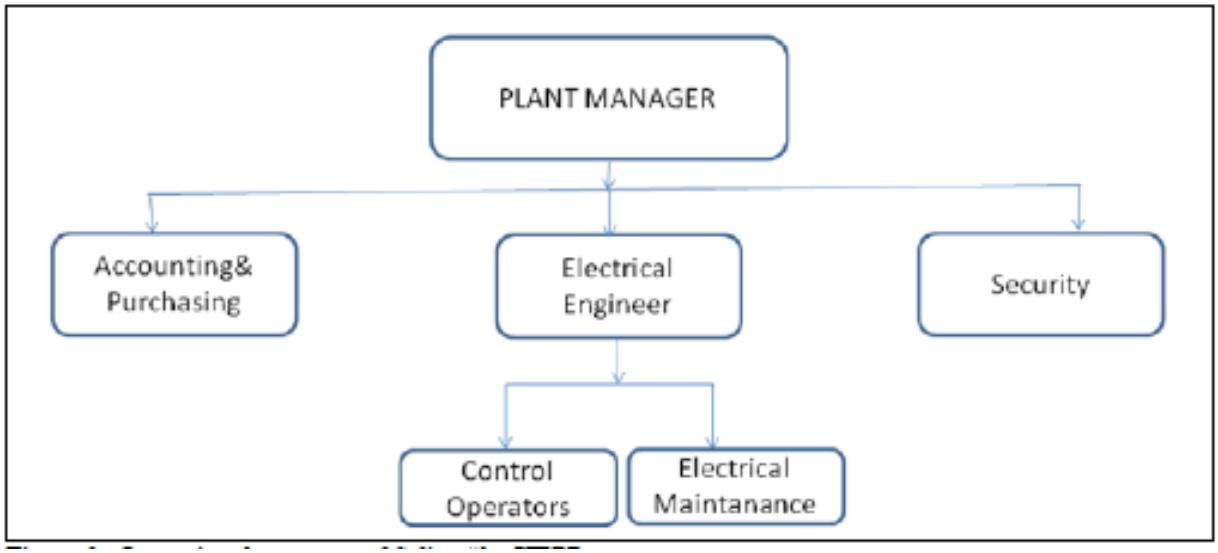


Figure 3 . Operational structure of Selimoğlu HEPP

The net electricity fed to the grid is measured continuously and recorded monthly by TEIAS. For consistency, recorded data has been compared with PMUM records.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	CO_2 emission factor of the grid-Combined Margin Emission Factor
Source of data	Calculated according to section B.6.3 of the validated PDD
Value(s) applied	0,562
Purpose of data	Calculation of baseline emissions
Additional comment	-

D.2. Data and parameters monitored

Data/Parameter	EGy
Unit	GWh
Description	Net Electricity generated and delivered to the grid by the power plant in year y
Measured/Calculated /Default	Measured and calculated
Source of data	Metering devices used in power plants, monthly records signed by TEIAS and plants manager and invoices will be used.
Value(s) of monitored parameter	The estimated annual electricity generation is 31.97 GWh as per the generation license. The recorded generation during the monitoring period is 70,054.246 MWh.
Monitoring equipment	Electricity meters Model: Elster A1500 Accuracy class:0,2s Main meter serial number :395378 Back- up Meter serial Number: 395370 Last Calibration: 17/12/2009 Calibration frequency : At least every 10 years as per the by law on the Meters and metering Equipment.[8]
Measuring/Reading/ Recording frequency	Continuous Measurement, Monthly recording and reading
Calculation method (if applicable)	To calculate net generation, internal consumption values is extracted from generation
QA/QC procedures	Two ammeters (ELSTER A1500) will backup each other. These meters will be chosen according to national regulations and approved and sealed by TEIAS at start up of the plant. Maintenance and calibration of the metering devices will be made by TEIAS periodically. In addition to invoices and metering devices, the electricity delivered to the grid can be cross checked through TEIAS web page(http://pmum.teias.gov.tr) using the ID and password of the project owner. All records will be kept for at least two years.
Purpose of data	Calculation baseline emissions
Additional comment	-

[8] http://www.mevzuat.adalet.gov.tr/html/21179.html

Data/Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description	Quantity of fuel type i combusted in Diesel power generator during the year y
Measured/Calculated /Default	Measured and/or Calculated
Source of data	Onsite measurements from equipment working hours.
Value(s) of monitored parameter	4.715 ton during the monitoring period
Monitoring equipment	Meter on diesel generator
Measuring/Reading/ Recording frequency	Continuously
Calculation method (if applicable)	Working hour (h) is multiplied by consumption rate (lt/h)
QA/QC procedures	Data recorded by the equipment will be cross-checked by monthly record of diesel generator working hour
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	Cap_{pj}
Unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Measured/Calculated /Default	On-site check
Source of data	Provisional acceptance certificate
Value(s) of monitored parameter	9,330,000W
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	yearly
Calculation method (if applicable)	N/A
QA/QC procedures	N/A
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	A_{PJ}
Unit	m^2
Description	Area of the reservoir measured in the surface of the water, when the reservoir is full.
Measured/Calculated /Default	Measured and/or calculated by topographical engineer
Source of data	Selimoğlu Reservoir Area Map
Value(s) of monitored parameter	11,414.3 m^2
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	yearly
Calculation method (if applicable)	N/A
QA/QC procedures	N/A
Purpose of data	Calculation of Project emissions
Additional comment	-

Data/Parameter	NCV
Unit	GJ/tonne
Description	Net calorific value of diesel oil
Measured/Calculated /Default	Calculated
Source of data	http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/49.xls http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/47.xls
Value(s) of monitored parameter	42,991.117
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	The project owner checks periodically, at least for every defined monitoring period, the source of information and update the values for emission reduction calculations in case the value changes.
Calculation method (if applicable)	Total heating value from consumed diesel oil is divided by total diesel oil consumed in 2010
QA/QC procedures	N/A
Purpose of data	Calculation of Project emissions
Additional comment	-

Data/Parameter	EF_{CO2}
Unit	tCO_2/GJ
Description	Emission factor of diesel oil
Measured/Calculated /Default	Default and calculated
Source of data	http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/tur-2012-crf-14apr.zip
Value(s) of monitored parameter	0,073 tCO_2/GJ
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	The project owner checks periodically, at least for every defined monitoring period, the source of information and update the values for emission reduction calculations in case the value changes.
Calculation method (if applicable)	Default value of carbon emission factor for diesel oil is converted to CO_2 emission factor by multiplied 44 and divided 12
QA/QC procedures	N/A
Purpose of data	Calculation of Project emissions
Additional comment	

D.3. Implementation of sampling plan

N/A

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

The ex-post emission reductions (ERy) are calculated as follows:

$$ERy = BEy - PEy - LEy$$

Where:

ERy = Emission reductions in year *y* (tCO_2)
BEy = Baseline emissions in year *y* (tCO_2)
PEy = Project Emissions in year *y* (tCO_2)
LEy = Leakage emissions in year *y* (tCO_2)

Baseline emissions

Baseline emission is calculated according to the formula

$$BE_y = EG_y \times EF_{grid,CM,y}$$

Where:

EGy = Net electricity delivered to the grid by the project activity in year y excluding transmission losses of the grid.
$EF_{grid,CM,y}$ = CO_2 Combined Margin Emission Factor of the grid-according to selected methodology

EGy	*EGy (*MWh)	$EF_{grid,CM,y}$(tCO_2/MWh)	BE_y ($tCO_{2)}$
2010	25,889.446	0.562	14,549
2011	25,884.532		14,547
2012(Jan-June)	18,280.268		10,274
		TOTAL	39,370

E.2. Calculation of project emissions or actual net GHG removals by sinks

The proposed project activity involves the generation of electricity by a hydroelectric power plant which has power density higher than 10W/m2. Therefore emissions from reservoir are ignored as per the applied methodology.

The power density of the project activity (PD) is calculated as follows: $PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$

Where :

PD = Power density of the project activity (W/m^2)
Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero
A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

For Proposed Project,

Cap_{pj} =9,330,000 W
Cap_{BL} = 0.0 W
A_{PJ} =11,414.3 (m^2)[9]
A_{BL} = 0.0 (m^2)

Therefore PD is calculated as;

$$PD = \frac{9330000 - 0}{11414.3 - 0}$$

$$PD = 817.4\ W/m^2$$

Since power density is higher than 10W/m2, project emissions are determined as "0" as per the methodology.

[9] Selimoğlu Reservoir Map Area

Therefore, the only emission source in the plant is the diesel generator which is used as auxiliary power source when there is no electricity generation in the plant or supply by the grid. For proposed project, brand and model of the equipment used is Cummins 4BTA 3.9 –G4 which has maximum fuel consumption of 20Lt/hour at full load. According to the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" CO2 emissions from fossil fuel combustion for process j are calculated based on the quantity of fuels combusted and the CO2 emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_{i} FC_{i,j,y} \times COEF_{i,y}$$

Where:

$PE_{FC,j,y}$ = Are the CO_2 emissions from fossil fuel combustion in process j during the year *y* (tCO_2/yr);

$FC_{i,j,y}$ = Is the quantity of fuel type *i* combusted in process *j* during the year *y* (mass or volume unit/yr);

$COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type *i* in year *y* (tCO_2/mass or volume unit)

i = Are the fuel types combusted in process *j* during the year *y*

For calculating the $COEF_{i,y}$ option B has been used which is given as;

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (4)$$

Where:

$COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type i in year *y* (tCO_2/mass or volume unit)

$NCV_{i,y}$ = Is the weighted average net calorific value of the fuel type *i* in year *y* (GJ/mass or volume unit)

$EF_{CO2,i,y}$ = Is the weighted average CO_2 emission factor of fuel type *i* in year *y* (tCO_2/GJ)

i = Are the fuel types combusted in process *j* during the year *y*

NCV and EF values which have been updated based on 2010 data have been used for COEF calculation. All references has been indicated in the excel sheet.

Parameter	Value	Unit
Total working hours	279	hour
Hourly Consumption at Max Load	20	lt/hour
Density of Diesel oil	0.845	g/cm^3 or kg/Liter
$\sum FC_{i,j,y}$	4.715	tonnes
$EF_{i,y}$	0,07333	tCO2/GJ
$NCV_{i,y}$	42991,12	GJ/kt
COEF	3152,68	tCO2/kt
Project Emissions from diesel Generator	14,865≅15	tCO2

For conservativeness, maximum consumption and data from monitor on diesel generator has been used for calculating project emissions. Based on these parameters, PE due to diesel generator has been calculated for the monitoring period. Calculations and references are indicated in excel sheet. Moreover, Project emissions have been interpolated based on year and has been tabulated below.

Year	Project emissions
2010	6 tCO_2
2011	6 tCO_2
2012 (Jan 2012-June 2012)	3 tCO_2

E.3. Calculation of leakage

The energy generating equipment is not transferred from or to another activity. Therefore leakage is also considered as "0".

$$LE_y=0$$

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO_2e)	Project emissions or actual net GHG removals by sinks (tCO_{2e})	Leakage (tCO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2e)
2010	14,549	6	0	14,543
2011	14,547	6	0	14,541
2012(Jan 2012-June 2012)	10,244	3	0	10,271
Total	39,370	15	0	39,355

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
2010	17,954	14,543
2011	17,954	14,541
2012(Jan 2012-June 2012)	8,977	10,271
Emission reductions or GHG removals by sinks (tCO_2e)	44,885	39,355

E.6. Remarks on difference from estimated value in registered PDD

Actuals values are lower than estimated values due to the generation figures. Since the generation is dependent on flow rate estimation which is a natural phenomenon and cannot be estimated with 100% accuracy.

SECTION F.

F.1. Monitoring of Sustainable Development Parameters

No		1
Indicator		Air Quality
Mitigation measure		N/A
Chosen parameter 1.1		SO_2 emissions by thermal power plants.
Current situation of parameter 1.1		Total SO_2 emission related to electricity generation is about 413.78 Gg for 2010 according to National Inventory of Turkey[10].
		Considering that electricity generation in 2010 is 211,208GWh, SO2 emission per MWh is calculated as 1,96 kg/MWh.
Future target for parameter 1.1		Target for the parameter is to continue to reduce SO2 emissions in parallel with the annual generation.
Actual Value for parameter 1.1		In parallel to the electricity generation 70,054 MWh, actual SO_2 emission reduction has been realized as about 137 tonne during 30 months monitoring period
Chosen parameter 1.2		NOx emissions by thermal power plants
Current situation of parameter 1.2		Total NOx emission related to electricity generation is about 317.45Gg for 2010 according to National Inventory of Turkey.
Future target for parameter 1.2		Target for the parameter is to continue to reduce NOx emissions in parallel with the annual generation.
Actual Value For Parameter 1.2		In parallel to the electricity generation, actual NOx emission reduction has been realized as 105 tonnes during 30 months monitoring period.
Way of monitoring	How	Electricity generated by Selimoglu HEPP and NO_X and SO_2 emission data from GHG inventory of Turkey will be used as reference in calculation of the emission reduction.
	When	Yearly
	By who	Project owner

10 http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/tur-2010-crf-15april.zip,Worksheet:Table1s1 **)**

No		2
Indicator		Water Quality and Quantity
Mitigation measure		Release of minimum flow to protect aquatic life and assessment of adequacy of environmental flow by an expert. Water Flow will be monitored and an independent expert with relevant background and experience will assess the adequacy of minimal flow. The expert report will include fieldwork and observation as required by GS and additional measures/recommendations if any.
Chosen parameter 2.1		Flow rate of water released from the weir.
Current situation of parameter 2.1		The weir was constructed. Water has been released from the weir
Future target for parameter 2.1		Minimum 10% of average natural flow (as mandated by DSI)
Actual Value for parameter 2.1		Minimum flow is determined 0.452 m^3/s. [11] After expert assessment and project owner has committed that flow rate will be 0.600 m^3/s[12] when there is sufficient water in the weir location. Parameter will continue to be monitored and submitted to DOE during next verification. Parameters monitored are provided, and ıt can be seen that minimum flow rates are more than 0.600 m^3/s.
Way of monitoring	How	Flow measurements from the weir
	When	Flow will be monitored continuously by DSI gauging stations installed at the downstream. Data will be requested from DSI before verification and submitted to DOE.
	By who	Project owner
Chosen parameter 2.2		Waste water
Current situation of parameter 2.2		Hepp has been opeareted.
Future target for parameter 2.2		Disposal of waste water as required by the relevant regulations
Actual Value of Parameter 2.2		Waste water has been disposed as per the releated regulations
Way of monitoring	How	Checking waste water disposal records.
	When	Annually
	By who	Project owner

No	3
Indicator	Biodiversity
Mitigation measure	Release of minimum flow from fish passage to protect aquatic life
Chosen parameter	Flow released from the fish passage
Current situation of parameter	The weir was constructed. Water has been released from the weir
Future target for parameter	Release of sufficient flow from the weir for fish migration.
Actual Value of Parameter	Minimum flow is determined 0.452 m^3/s.[14] After expert assessment and project owner has committed that flow rate will be 0.600 m^3/s[15] when there is sufficient water in the weir location. Parameter will continue to be monitored and submitted to DOE during next verification. Parameters monitored are provided, and ıt can be seen that minimum flow rates are more than 0.600 m^3/s.

[11] Minimum flow has been released according to agreement with Provincial Directorate of Environment and Forestry. Parameters

[12] Selimoğlu HEPP Additional Expert Report, March 2012

[13] Selimoğlu HEPP Additional Expert Report, March 2012

[14] Minimum flow has been released according to agreement with Provincial Directorate of Environment and Forestry.

Way of monitoring	How	Flow released will be monitored continuously by DSI gauging station installed at the downstream of the plant. Data will be requested from DSI before verification and submitted to DOE.
	When	Annually
	By who	Project owner

No		4
Indicator		Biodiversity
Mitigation measure		Building a functional fish passage
Chosen parameter		Functionality of fish passage
Current situation of parameter		Fish passage has been constructed.
Future target for parameter		Effective and proper functioning of fish passage
Actual Value of Parameter		As per expert opinion, needed flow rate for fish passage is between 0.05 and 0.5 m^3/s. This flow rate is much lower than the minimum flow rate. Design of the fish passage is assessed as appropriate for the region as per the expert report. No revision about structure of the fish passage has been raised. Fish passage will be kept operational and clean to prevent clogging due to debris as per recommendation of the expert.
Way of monitoring	How	Expert assessment has been made for the fish passage design. Report has been submitted to DOE and GS.
	When	Once after project is completed.
	By who	Project owner

No		5 (DNH-8)
Indicator		Quality of Employment
Mitigation measure		Recruited people will be trained for increasing technical skills and
Chosen parameter		Number of people trained (certificates)
Current situation of parameter		Employees have been trained.
Future target for parameter		All technical staff working with high voltage equipment should be
Actual Value of Parameter		Related documents are provided
Way of monitoring	How	Documents for trainings and certificates issued.
	When	Annually
	By who	Project owner

No	6 (DNH-3)
Indicator	Livelihood of the poor
Mitigation measure	Compensation for expropriation
Chosen parameter	Compensations made to locals
Current situation of parameter	Compensation for expropriation was finished
Future target for parameter	The expropriation will be very small as the project includes a tunnel. All expropriated land will be compensated.
Actual Value of Parameter	All expropriated land was compensated. Related documents are attached.

[15] Selimoğlu HEPP Additional Expert Report, March 2012

Way of monitoring	How	Interview with owners of expropriated land
	When	Once after construction is completed
	By who	Project Owner

No		7
Indicator		Access to clean affordable energy services
Mitigation measure		No mitigation action is required.
Chosen parameter		Amount of natural gas imported for power production
Current situation of parameter		In 2010, about 21.8 bn m^3 natural gas been used for about 98,000 GWh electricity generation.
Future target for parameter		Target for the parameter is to continue to reduce natural gas consumption in parallel with the annual generation.
Actual Value of Parameter		Corresponding to 70,055 MWh electricity generation, projects has prevented natural gas and coal import. Assuming all avoided fuel import is natural gas, it is calculated that about 15.55 million m^3 of natural gas is avoided.
Way of monitoring	How	Through monitoring electricity generation
	When	Annually
	By who	Project owner

No		8
Indicator		Quantitative employment and income generation
Mitigation measure		Mitigation measure is not required.
Chosen parameter		Payments made to staff
Current situation of parameter		HEPP is operated. People have been employeed.
Future target for parameter		Approximately 10 people during operation stage is planned to be employed. Payment made is to be determined later.
Actual Value of Parameter		Employees are listed below: - Ömer Akbulut - Salim Sarıkoç - Ali Bektaş - Bünyamin Çavuşoğlu - Erkan Kul - Recep ÖZBAKIR - Halil İbrahim KARA Related documents are attached
Way of monitoring	How	Through evaluation documents for wages paid and social security documents.
	When	Once for crediting period or yearly
	By who	Project owner

No	9
Indicator	Balance of payments
Mitigation measure	Decrease dependency on fossil fuel through increasing use of local resources.
Chosen parameter	Currency saving.

Current situation of parameter		In 2010, about 21.8 bn m^3 natural gas been used for about 98,000 GWh electricity generation.
Future target for parameter		To decrease natural gas consumed for electricity generation. To increase currency savings
Actual Value of Parameter		Corresponding to 70,055MWh electricity generation, projects has prevented natural gas and coal import. Assuming all avoided fuel import is natural gas, it is calculated that about 15 million m^3 of natural gas is avoided and 5 million € foreign currency is saved.
Way of monitoring	How	Through comparing electricity generated by Selimoglu HEPP and natural gas that would be used to produce the same amount of electricity according to baseline scenario.
	When	Yearly
	By who	Project owner

No		10
Indicator		Soil Condition
Mitigation measure		Mitigation Measure is not required
Chosen parameter		Soil erosion and leakage within the project site
Current situation of parameter		Erosion without project activity
Future target for parameter		No erosion due to project activities.
Actual value of Parameter		There is no erosion due to project activities. To be determined in verification site visit with DOE
Way of monitoring	How	Site investigation and interviews with locals.
	When	Annually
	By who	Project owner

No		11
Indicator		Soil condition
Mitigation measure		Sediment Passage
Chosen parameter		Sediment transport along the river
Current situation of parameter		No accumulation at the upstream and downstream of the weir.
Future target for parameter		No accumulation at the upstream and downstream of the weir.
Actual value of Parameter		To be determined in verification site visit with DOE
Way of monitoring	How	Visual observations and pictures taken on site.
	When	Yearly
	By who	Project owner

No	12
Indicator	Soil condition
Mitigation measure	Excavation wastes used in construction and stored in appropriate locations.
Chosen parameter	Storage of excavation wastes in appropriate locations.
Current situation of parameter	None
Future target for parameter	No accumulation at the upstream and downstream of the weir.

Actual value of Parameter		There is no excavation aggregate.  To be determined in verification site visit with DOE.
Way of monitoring	How	Through site visits and continuous monitoring during construction
	When	Once after completion of the construction
	By who	Project owner

No		13
Indicator		Livelihood of the poor
Mitigation measure		Providing electricity for old corn mill if requested by locals
Chosen parameter		Demand for use of corn mill by locals
Current situation of parameter		Corn mill is not used.
Future target for parameter		Ensure that water is sufficient for corn mill if it is needed to be used in the future.
Actual value of Parameter		Corn mill is not used. (Figure 4). Locals have not claimed water for corn mill.  Figure 4 Corn mill
Way of monitoring	How	Through site visits and interviews with locals
	When	Annually
	By who	Project owner

No	14
Indicator	Livelihood of the poor
Mitigation measure	Ensuring springs appear or providing new pipeline
Chosen parameter	Availability of water for locals around project site.
Current situation of parameter	Water is available for locals around the project site
Future target for parameter	Water should be available either via springs appearing back or new pipe for water should be installed.

Actual value of Parameter		Project owner constructed water tank and helped locals out financially and technically to construct new pipeline. People supported are listed below: • Nurettin Şahin • Osman Koz • Murat Koz Related documents are attached
Way of monitoring	How	Through site visits and interviews with locals
	When	Once after construction is completed.
	By who	Project owner

No		15
Indicator		Other Pollutants (DNH 9)
Mitigation measure		Wastes generated during operation are collected and disposed as per the regulations numbered 2240-5249 and 4473-7756 dated 12/08/1996 and 21/11/1997 respectively.
Chosen parameter		Disposal of oil and other wastes (solid and liquid wastes)
Current situation of parameter		Operation has been started. Wastes generated has been collected and disposed as per regulations
Future target for parameter		All wastes should be disposed properly.
Actual value of Parameter		Relevant documents are provided. To be determined in verification site visit
Way of monitoring	How	Checking waste disposal records for oil and other wastes
	When	Annually
	By who	Project Owner

No		16
Indicator		Other Pollutants -Dust
Mitigation measure		Covering trucks and irrigating excavation site.
Chosen parameter		Dust formation around the project site.
Current situation of parameter		Construction was completed.
Future target for parameter		None
Actual value of Parameter		To be interviewed with stakeholders in verification site visit.
Way of monitoring	How	Interviews with stakeholders for assessing pollution caused by dust formation
	When	Once after construction is completed.
	By who	Project owner

F.2. Commintments of Project Owner and Additional Sustainable Development Parameters

Project Owner has signed a commitment to mitigate the impacts of project. To decrease the impact of the project on water quality and biodiversity, measures have been identified by expert (Sezgin Hacısalihoğlu). In the export report, algae formation has been determined and the reasons of algae formation have been indicated as summer heat and minimum released water. The other import issue is Black sea salmon population. To decrease the algae formation and to protect Black sea salmon population, measures taken by project owner is listed below:

1. The minimum flow rate will be 600 m^3/sn. If the flow rate is below this value in July and August, all water will be released from the fish passage.
2. Gauging station has been moved and constructed after fish passage
3. Commitments will be monitored by Sezgin Hacısalihoğlu and report will be prepared yearly. ,

No		17
Indicator		Water Quality and Quantity
Mitigation measure		Release of minimum flow to prevent the formation of algae.
Chosen parameter		Flow rate of water released from fish passage
Current situation		Minimum 10% of average natural flow (as mandated by DSI)
Future target for parameter		0,600 m^3/s will be released
Way of monitoring	How	Flow measurements from fish passage and expert report
	When	Flow will be monitored continuously by DSI gauging stations installed at the downstream. Data will be requested from DSI before verification and submitted to DOE.
	By who	Project owner

No		18
Indicator		Biodiversity
Mitigation measure		Release of minimum flow fish passage to protect Black Sea Salmon population
Chosen parameter 18.1		Flow rate of water released the fish passage station
Current situation 18.1		Minimum 10% of average natural flow (as mandated by DSI)
Future target for parameter		0,600 m^3/s will be released
Way of monitoring	How	Flow measurements from fish passage
	When	Flow will be monitored continuously by DSI gauging stations installed after fish passage. Data will be requested from DSI before verification and submitted to DOE.
	By who	Project owner
Chosen parameter 18.2		Changing location of gauging station
Current situation 18.2		Gauging station has been moved after fish passage
Future target for parameter		Gauging station will state after fish passage
Way of monitoring	How	Site visit and photos
	When	Once after first verification
	By who	Project owner

History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
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