MONITORING REPORT

Document Prepared by Sekans Danışmanlık

Project Title	Kargilik 24 MW Hydropower Plant, Turkey
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Kargilik 24 MW Hydropower Plant, Turkey, which is developed by Tektug Elektrik Uretim Anonim Sirketi is a run-of-river hydropower project located in Kahramanmaras province, Turkey. It utilizes the gross water head of 150m on the Kesis River to generate and supply electricity from clean and renewable resources.

Total installed capacity of the project is 24 MWe, consisting of 2 turbines, with a predicted net power supply to the grid of 71,000 MWh per annum. The project is in operation since 24/04/2005[1].The estimated amount of GHG emission reduction is 43,717 tonnes CO2e per year in the registered PDD. During its operation during this monitoring period, the actualized net electricity generation is 357,707.75 MWh. By displacing equivalent amount of electricity consumed from the national grid which is mostly comprised of fossil fired power plants, the actual emission reduction has been calculated as 220,348 tonnes CO2 for this monitoring period.

The project planning was started before 1996, however the construction could only be finished in 2005.

The project has produced positive environmental benefits as displacing the electricity generated by fossil fuel fired power plants by utilising the renewable resources so as to avoid environmental pollution and GHG emissions.

Please see the vintage based comparison of expected and achieved emission reductions for this monitoring period:

Table 1- Expected vs achieved emission reductions

Vintage	Period	Total Days	Amount achieved during this monitoring period (tCO2e)	Amount estimated ex ante (tCO2e)	Difference (tCO2e)	Difference (%)
2011	01.04.2011-31.12.2011	275	33,949	32,937	1,011	3%

[1] The Ministry of Acceptance Protocol is available to the DOE.

2012	01.01.2012-31.12.2012	366	57,590	43,717	13,873	32%
2013	01.04.2013-31.12.2013	365	41,255	43,717	-2,462	-5.6%
2014	01.01.2014-31.12.2014	365	20,723	43,717	-22,994	-52.6%
2015	01.01.2015-31.12.2015	365	50,396	43,717	6,679	15.3%
2016	01.01.2016-27.03.2016	87	16,436	10,420	6,016	57.7%
Total		**1,823**	220,348	**218,226**	**2,122**	**1.0%**

Please see the Monitoring Timeline of the Project Activity as below:

Table 2 - Monitoring timeline of the Project Activity

Date (Period)	**Activity**
28/03/2006 - 31/12/2008	1st Monitoring Period
01/01/2009-31/03/2011	2nd Monitoring Period
01/04/ 2011-27/03/ 2016	3rd Monitoring Period

Please see the technical description of the Project Activity through Table 3:

Table 3 - Technical description of the Project Activity[2]

Turbine Brand	ALSTOM
Turbine Type	Francis Turbine Neyrpic
Number of units	2
Turbine	Rotations: 750 rpm Type: Vertical Francis
Water flow rate	9m3/s

[2] The photographic evidences of turbine name plates are available to the DOE.

Net head at 9.00 m3/s	145.62 m
Turbine Power	11.950 kW

1.2 Sectoral Scope and Project Type

According to UNFCCC sectoral scopes definition for CDM projects, the Project Activity is included in the Sectoral Scope 1, category “Energy industries (renewable - / nonrenewable sources)”. The project is a single green field investment and is not part of a project group or bundle.

1.3 Project Proponent

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Organization name	Tektuğ Elektrik Üretim A.Ş.
Contact person	Elvan Tuğsuz Güven
Title	Financial & Administrative Affairs Group Director / Board Member
Address	Atatürk Bulvari No:89/2-3 Şahinbey, Gaziantep
Telephone	90-342-2300325
Email	eguven@tektug.com

1.4 Other Entities Involved in the Project

Organization name	Sekans Danışmanlık
Role in the Project	Consultant
Contact person	Sıla Duran

Title	Consultant
Address	Konaklar Mah. 34330,4. Levent - Istanbul
Telephone	-
Email	sila@sekansdanismanlik.com

1.5 Project Start Date.

The project start date is 24/04/2005.

1.6 Project Crediting Period

The Project's total crediting period is ten years renewable twice: 28/03/2006 – 27/03/2016 (both days are included).

1.7 Project Location

The project is located in the northern Mediterranean Sea region of Turkey, near Andırın town, Kahramanmaras Province, Turkey. The regulator and the powerhouse are located close to Kocafakili, Kelesli and Hacimahmutlu neighbourhoods. Andirin Town, where the Project is located at, lies west of Kahramanmaras, a province in the South East of Turkey. The Project will partially divert the Kesis River water flow to a regulator structure and use the water head to drive turbines. This electricity will be then supplied to the national grid. The coordinates of the Project Activity is The powerhouse is located at 37°32'09.61"N and 36° 14'40.97"E[3].

[3] Google Earth screenshot of the coordinates is available to the DOE.

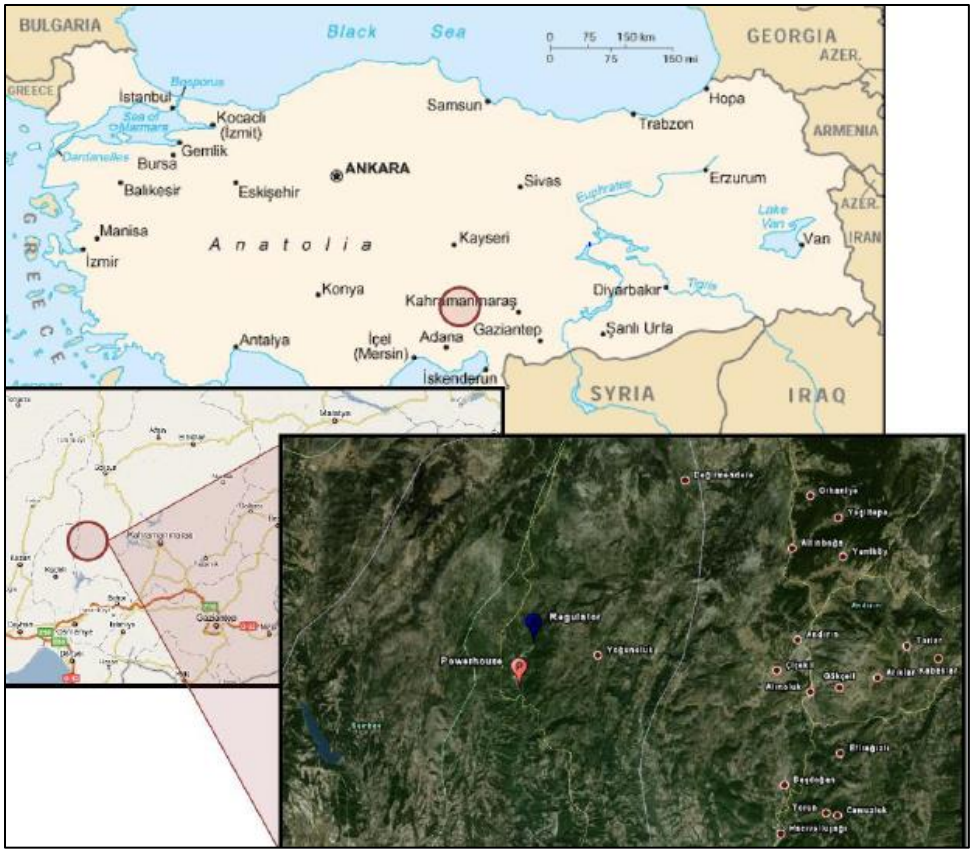

Figure 1. The location of the project

1.8 Title and Reference of Methodology

The emission reductions of the Project were calculated in accordance with the approved large scale CDM-methodology ACM0002, “Consolidated methodology for grid connected electricity generation from renewable sources”, version 9.

“Tool to calculate the emission factor for an electricity system”, Version 01 is utilized to carry out the baseline calculations.

1.9 Participation under other GHG Programs

The project has never been included in an emissions trading program or any other binding limits. It has neither received any kind of environmental credits nor been registered under any other GHG programs.

1.10 Other Forms of Credit

The project has not created another form of credit..

1.11 Sustainable Development

The project produces electricity from renewable energy sources using hydro as the power source and to contribute to Turkey's growing electricity demand through a sustainable and low carbon technology. The project displaces the same amount of electricity generated by the grid dominated with fossil fired power plants. The project is expected to generate 71,000 MWh annually. The project contributes to the Sustainable Development Goal, Affordable and Clean Energy.

The annual emission reduction estimated by the project is 43,717 tonnes CO2eq, approximately. While this amount of emissions is mitigated, technology transfer is also realized as benefitting from hydropower.

The project contributes to improve the environmental situation in the region and in the country as avoiding fossil fuel-based electricity will enhance the air quality and help to reduce the negative effects on the climate. Through renewable technologies and hydro-based electricity sustainable and climate friendly development is promoted. The project contributes to the Sustainable Development Goal, Climate Action.

During construction and operational period, the project has created employment opportunities for the local community. The project contributes the economic development of the region by providing sustainable energy resources. The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments. Thus, the project contributes to the Sustainable Development Goal, Decent Work and Economic Growth.

2 SAFEGUARDS

2.1 No Net Harm

There isn't any negative environmental or socio-economic impact.

2.2 Local Stakeholder Consultation

During planning and construction phases, local stakeholders have been contacted by the project owners to inform them about the Project and to gather their comments. Vis-à-vis meetings with the following stakeholders have been organized:

- Governor of Kahramanmaras
- Director of Kahramanmaras Regional Forestry Department
- Director of Andirin Forestry Department

- Village headman of Bulgurkaya village

The common outcome of these meetings was positive and contacted stakeholders are in favour of the Project.

The operators who were employed during project construction phase have been trained by the Chamber of Mechanical Engineers, contributing to capacity building and knowhow transfer. Land purchases in the area have been performed such that land owners were compensated a multiple of the real land value.

Local people were employed during construction and are being employed during operation. This contributes to local economy and leads to improvement in living standards. Local people, who sold their land, also supported the Project, as the sales price was much beyond the market value of these lands. This also supported the local economy. Because of some land registry issues (such as possession ambiguities or lack of land title deeds), some land is expropriated, whereby the landowners were compensated with payments at least double of the market values. Therefore, the Project did not result in local disapproval.

The Project has resulted in the creation of new jobs in the project region and improvement in local roads, contributing to living standards in the region. Moreover, the project owner has provided contribution in kind to the local community, although these activities are not required legally. As a result, the community is supporting the project and they believe that it creates a momentum for local sustainable development.

There was no specific environmental problem that concerned the locals more than others, and environmental issues need to be solved by the government. All people considered clear signs of climate change in the region in recent years.

The contact information of the plant responsible exist at the Mukhtar, the project owner and local community are always in touch. The project owner regularly checks with the Mukhtar if any complaint or a request exists. Any complaint or need from the local community could directly be received by the project owner and appropriate contributions or improvements are made to the local community. An announcement stating the contact details of the Project relevant staff in case of any complaint by close surroundings has been put up on the village mosque to be seen by the villagers. Regarding the monitoring period, a signed letter by the Mukhtar has been provided as declaring that the related information has been available to the villagers and they did not have any complaint.

There is no update or any change to the project design after the registration of the project.

2.3 AFOLU-Specific Safeguards

N/A

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The description of the implementation and operational status of the project and the installed technology(ies), technical process and equipment are detailed in Section 1.1.

Other entity involved in the Project was Mavi Surdurulebilir Kalkinma Proje ve Danismanlik Hiz. Ltd. Sti. in the project description. However, it's been changed as Sekans Danışmanlık after the second periodic monitoring period.

3.2 Deviations

2.3.1 Methodology Deviations

There are no methodology deviations applied during this monitoring period.

2.3.2 Project Description Deviations

There are no project description deviations applied during this monitoring period.

3.3 Grouped Projects

This is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

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Data / Parameter	$GEN_{i,y}$
Data unit	GWh
Description	The gross electricity generation by fuel type i in year y (2002-2007)
Source of data	Turkish Electricity Transmission Company (TEIAS) website https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Table 20. Gross and Net Electricity Generation [GWh] in Turkey in PD

Justification of choice of data or description of measurement methods and procedures applied	TEIAS annually publishes official data regarding electricity generation. Average share of each source in the overall generation has been calculated.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Net Electricity Generation$_y$
Data unit	GWh
Description	The difference between the total quantity of electricity generated by power plants/units and the auxiliary electricity consumption of power plants/units.
Source of data	Turkish Electricity Transmission Company (TEIAS) website https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Table 20. Gross and Net Electricity Generation [GWh] in Turkey in PD
Justification of choice of data or description of measurement methods and procedures applied	TEIAS annually publishes official data regarding electricity generation. Average share of each source in the overall generation has been calculated.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Net Delivery Ratio$_y$
Data unit	-
Description	The ratio of the total Net Electricity Generation to the total Gross Electricity Generation in year y.
Source of data	Net Electricity Generation and Gross Electricity Generation data from https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Table 20. Gross and Net Electricity Generation [GWh] in Turkey in PD
Justification of choice of data or description of measurement methods and procedures applied	Electricity delivered to the grid by each power plant/unit or fuel source is unavailable. The Net Delivery Ratioy is used for approximating the net electricity amount delivered to the grid by power plants/units except lc-mr sources (GENy).
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	GENy
Data unit	GWh
Description	The net electricity delivered to the grid in year y
Source of data	Calculation steps (for each year y): 1. Gross electricity generation excluding lc-mr sources = Total gross electricity generation from all sources total gross electricity generation from lc-mr sources 2. Net electricity generation excluding lc-mr sources = Gross electricity generation except lc-mr sources * Net Delivery Ratio 3. Net electricity delivered to the grid excluding lc-mr sources = Net electricity generation excluding lc-mr sources + Imports https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Table 28. Electricity Supply to Grid Equation in PD
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	-.

Data / Parameter	$FC_{i,y}$
Data unit	ton or 1000 m^3
Description	Total amount of fossil fuel type i consumed by power plants/units in year y
Source of data	Turkish Electricity Transmission Company (TEIAS) website https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Table 29. NCVs and Emission Factors of Fuels in PD
Justification of choice of data or description of measurement methods and procedures applied	Fuel consumption breakdown by power plant/unit is unavailable, total consumption amounts are published annually by TEIAS. These data are used together with HVi,y for calculating the NCV of each fuel type i.
Purpose of Data	Calculation of baseline emissions

Comments	-.

Data / Parameter	HVi,y
Data unit	Tcal
Description	Heating values of fuels consumed in thermal power plants in Turkey by the electric utilities
Source of data	Turkish Electricity Transmission Company (TEIAS) website https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Table 29. NCVs and Emission Factors of Fuels in PD
Justification of choice of data or description of measurement methods and procedures applied	Fuel consumption breakdown by power plant/unit is unavailable, total consumption amounts are published annually by TEIAS. These data are used together with HVi,y for calculating the NCV of each fuel type i.
Purpose of Data	Calculation of baseline emissions
Comments	-.

Data / Parameter	NCVi,y
Data unit	TJ/kt or TJ/m3
Description	Net calorific value of fossil fuel type i in year y
Source of data	Net calorific values of fuels used for power generation are not provided directly, but they are calculated as average by dividing HVi,y by FCi,y, both of which are officially published.
Value applied	Table 29. NCVs and Emission Factors of Fuels in PD
Justification of choice of data or description of measurement methods and procedures applied	Since NCVs can be calculated, IPCC guideline figures are not used.
Purpose of Data	Calculation of baseline emissions
Comments	2006 and 2007 breakdowns of fuel consumption data do not differentiate between coal types. Therefore, the total of hard coal and imported coal in 2006 and 2007 are broken down with a constant divisor, which is the ratio of hard coal/imported coal in 2005. Please refer to the baseline calculation spreadsheet for further details.

Data / Parameter	$EF_{CO2,i,y}$
Data unit	tCO2/TJ
Description	CO_2 emission factor of fossil fuel type i in year y
Source of data	Primary Source (for fuel types included in the report): "TURKEY Greenhouse Gas Inventory, 1990 to 2005", Annex 2, p.9. Source: http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3929.php Secondary Source (for fuel types not included in the national GHG inventory report): The lower limits of the 95% confidence interval stated in the "2006 IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Chapter 1 (energy) Table 1.4.
Value applied	Table 29. NCVs and Emission Factors of Fuels in PD
Justification of choice of data or description of measurement methods and procedures applied	Local Emission factor information is available for certain fuel types, which are submitted to the UNFCCC in the 2005 Turkey National GHG Inventory Report (NIR). For the fuel types which are not described in this NIR, industry guidelines are used instead. The methodology suggests to prioritize the use of local data whenever available.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	EI_y
Data unit	GWh
Description	Net electricity imports delivered to the grid in year y
Source of data	Turkish Electricity Transmission Company (TEIAS) Website https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Table 28. Electricity Supply to Grid *in PD*
Justification of choice of data or description of measurement methods and procedures applied	This is the total electricity imported and delivered to the national grid from connected electricity systems (neighbour countries).
Purpose of Data	Calculation of baseline emissions

Comments	-

Data / Parameter	Electricity Capacity Additions
Data unit	-
Description	Power plants which are most recently taken into operation
Source of data	Annual Development of Fuels Consumed In Thermal Power Plants In Turkey By The Electric Utilities, TEIAS.: The reports are now available through the website of EPDK: https://www.epdk.org.tr/Detay/Icerik/3-0-66/elektrikuretim-kapasite-projeksiyonlari
Value applied	Table 32. Recent Capacity Additions 2003-2006 in PD
Justification of choice of data or description of measurement methods and procedures applied	Average generation values are used for hydro power plants. Since capacity additions between 2004-2006 are not sufficiently large, a natural gas / naphtha power plant has been included as well, which was taken into operation in year 2003.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$\eta_{m,y}$
Data unit	%
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	UNFCCC methodological tool “Tool to calculate the emission factor for an electricity system” Annex I
Value applied	Table 22. CO2 Emissions of Recent Capacity Additions by Fuel Type
Justification of choice of data or description of measurement methods and procedures applied	There is no official efficiency values available based on each power plant or each fuel type in Turkey. It is conservatively assumed that most natural gas power plants in Turkey are combined cycle, most coal power plants operate sub-critical and most liquid fuel power plants adopt an open cycle technology.
Purpose of Data	Calculation of baseline emissions
Comments	-

4.2 Data and Parameters Monitored

<table>
<tr><td>Data / Parameter</td><td>EGy</td></tr>
<tr><td>Data unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Annual net electricity generated by the Project Activity</td></tr>
<tr><td>Source of data</td><td>Measured by TEIAS-approved measurement devices and attained from the EPIAS[4] website, which is also used by TEIAS for invoicing.</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>The Project Activity is connected to the Andirin transformer station via a 14.4km long 154 kV transmission line. There are four metering instruments (power meters). These devices measure the net electricity supply to the national grid by the Project Activity, all losses before this point are on account of the project participant. Metering instruments, which continuously monitor and measure the net electricity delivered by the Project Activity, are sealed and only accessible by TEIAS personnel. Official TEIAS data from the EPIAS web site will be used for calculating EGy.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Monthly readings</td></tr>
<tr><td>Value monitored</td><td>55,111.21 MWh for 2011
93,489.56 MWh for 2012
66,971.62 MWh for 2013
33,641.82 MWh for 2014
81,812.00 MWh for 2015
26,681.54 MWh for 2016</td></tr>
<tr><td>Monitoring equipment</td><td>The net electricity is measured continuously by four electricity meters at the grid interface and recorded monthly. The total generated electricity can be reached through summing up the values monitored by two groups.
Power meters:
Group 1:
<table>
<tr><td></td><td>Main Meter</td><td>Spare Meter</td></tr>
<tr><td>Name</td><td>Ana Sayaç</td><td>Yedek Sayaç</td></tr>
<tr><td>Brand</td><td>ACTARIS</td><td>ACTARIS</td></tr>
<tr><td>Serial Number
Accuracy class</td><td>53036050
0.5 S</td><td>53036051
0.5 S</td></tr>
</table>
Group 2:</td></tr>
</table>

[4] PMUM has been replaced by EPIAS as of 01/09/2015 in Turkey during the verification period. Retrospective data is accessible via EPIAS.

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	ACTARIS	ACTARIS
Serial Number	53036078	53036079
Accuracy Class	0.5 S	0.5 S

Group 1 power and Group 2 power meters were changed on 01.12.2019.

The changed meters may be seen below:

Group 1:

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	ACTARIS	ACTARIS
Serial Number	53077750	53077751

Group 2:

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	ACTARIS	ACTARIS
Serial Number	53077752	53077753

QA/QC procedures to be applied

- A spare meter is used for crosschecking the accuracy and both meters are calibrated if required.
- The Meter Reading Forms are considered as the main source for the net electricity and the values are crosschecked with the EPIAS records.
- TEIAS is responsible for calibration and maintenance of the devices. The periodic calibration or maintenance is under the responsibility of TEIAS and has been fixed as once in 10 years[5]. Since TEİAŞ meters are sealed by TEİAŞ, the project proponent cannot intervene with the devices. The periodic tests are executed on annual basis[6].

[5] http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch

[6] The protocols of the tests are available to the DOE.

	• During this monitoring period, the meters were tested on 10.10.2015.[7]
Purpose of the data	Calculation of net electricity supplied to the grid and thus baseline emissions
Calculation method	Direct continuous measurement
Comments	-

4.3 Monitoring Plan

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emission reductions during the whole crediting period. The Project proponent is responsible for the implementation of the monitoring plan.

The Project Proponent is responsible for the overall management of the monitoring procedures including recording, data collection, calculating emission reductions and project emissions.

Please see below the management structure for the plant operation:

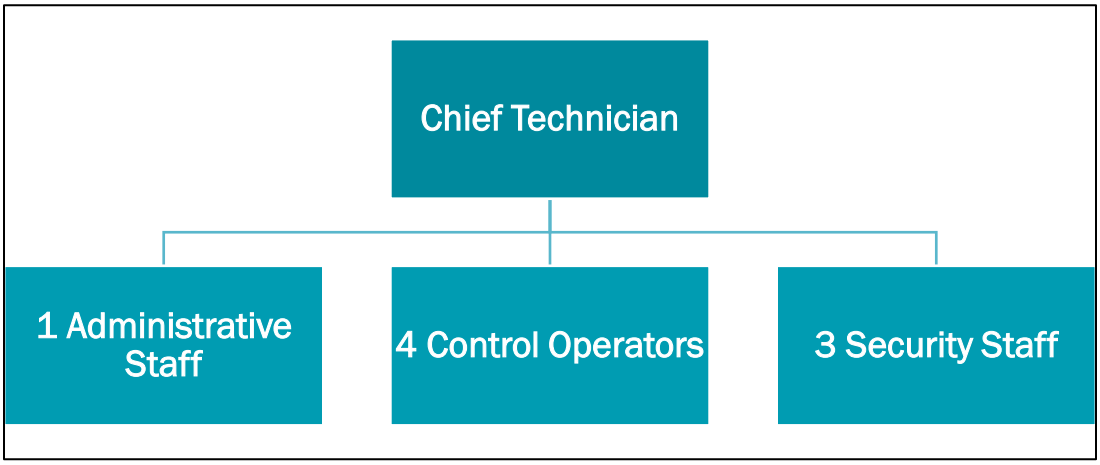

Figure 2. The management structure for the plant operation

The chief technician is responsible for the whole management of the Project Activity and theoperators are responsible for the implementation of the Project Activity. In addition to

[7] Test protocols are available to the DOE.

theoperators, there are threesecurity guards and one administrativestaff member working for the plant. In total, nine employees are working for the Project Activity.

Four power meters are installed at the grid interface of the project. There are two metering groups and in each group, one is the main meter and the other is spare meter of the main meter for cross-checking. Both meters are jointly inspected and sealed in order to be protected from interference by any of the parties. Both the main and secondary meters are owned and installed by the grid operator (TEIAS). The grid operator's is the only one authorized to deal with fixing, calibrating, or changing the meters, which will be done either by the grid operator or by a company authorized by the grid operator. During this monitoring period, there were no records of meter failure. In case of any urgent case TEIAS contacts the Plant Manager. Since the meters are within TEIAS' province, TEIAS executes all the procedures for handling non-conformities. Therefore, the Project Participant does not have any internal auditing for this purpose.

TEIAS is performing remote reading of the meters and monthly power meter readings are the basis for monitoring net electricity fed into the grid. A measuring protocol is prepared including day, peak and night hour electricity generation by the project owner and approved by governmental officers at the end of each month.

The primary source is the Meter Reading Forms. Net electricity exported is crosschecked with EPIAS records. EPİAS is the financial settlement centre of TEIAS[8]. The Meter Reading Forms are filled by the project owner and approved by the governmental officers. Additionally, the remote reading by the governmental body is also available. The website of EPİAS is accessible to Project Proponent with their unique user ID and password. Once accessed, the Project Proponent is able to call electricity generation and consumption reports of their own projects. The same reports are used by the Project Proponent for invoicing TEIAS. The electricity generation data is reported monthly basis.

Quality Control and Assurance (QC/QA)

Both the main and spare (control) meters are owned and installed by the grid company. Both meters are jointly inspected and sealed in order to be protected from interference by any of the parties.

The grid operator's Metering Officer should be notified of any failure of one of the meters. He is the only one authorized to deal with fixing, calibrating, or changing the meters, which will be done either by the grid operator or by a company authorized by the grid operator. During this monitoring period, there were no records of meter failure. The data is hourly

[8] PMUM has been replaced by EPIAS as of 01/09/2015 in Turkey during the verification period. Retrospective data is accessible via EPIAS.

recorded by the personnel on the plant. TEIAS Load Dispatching Center also executes remote reading during 24-hour period. The data could be remotely accessed by TEIAS.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emission BE_y (tCO2e) during the monitoring period results from:

$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$

Where:

BE_y	Baseline emissions in year y (tCO_2e/y)
$EG_{PJ,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for grid connected power generation in year y calculated by using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

$EF_{grid,CM,y}$ value is fixed as 0.616 tCO2/MWh for during the crediting period. Table 4 shows the baseline emissions for the verification period:

Table 4- Baseline emissions

Month	(A) Electricity supplied to the grid [MWh]	(B) Electricity consumption from the grid [MWh]	(C) = (A) - (B) EG (ID 8) Net electricity supplied to the grid [MWh]	EF [tCO_2/MWh]	Baseline emission: ER = EG * EF [t CO_2-eq]
Apr-11	13,413.11	0.68	13,412.43	0.616	8,262
May-11	12,908.37	1.98	12,906.39	0.616	7,950

Jun-11	8,210.72	6.97	8,203.75	0.616	5,054
Jul-11	5,594.01	10.49	5,583.52	0.616	3,439
Aug-11	5,610.29	13.78	5,596.51	0.616	3,447
Sep-11	2,941.68	23.96	2,917.72	0.616	1,797
Oct-11	1,932.95	25.22	1,907.73	0.616	1,175
Nov-11	1,907.88	24.73	1,883.15	0.616	1,160
Dec-11	2,725.37	25.36	2,700.01	0.616	1,663
Jan-12	9,032.97	11.73	9,021.24	0.616	5,557
Feb-12	8,830.46	12.29	8,818.17	0.616	5,432
Mar-12	13,344.81	4.55	13,340.26	0.616	8,218
Apr-12	15,699.79	-	15,699.79	0.616	9,671
May-12	14,273.38	1.58	14,271.80	0.616	8,791
Jun-12	5,862.57	16.76	5,845.81	0.616	3,601
Jul-12	6,168.24	11.74	6,156.50	0.616	3,792
Aug-12	4,164.91	13.22	4,151.69	0.616	2,557
Sep-12	2,299.02	17.59	2,281.43	0.616	1,405
Oct-12	2,541.88	17.93	2,523.95	0.616	1,555
Nov-12	2,928.63	17.75	2,910.88	0.616	1,793
Dec-12	8,476.51	8.46	8,468.05	0.616	5,216
Jan-13	7,767.07	10.49	7,756.58	0.616	4,778
Feb-13	11,980.89	1.33	11,979.56	0.616	7,379
Mar-13	8,735.64	7.50	8,728.14	0.616	5,377
Apr-13	10,332.82	3.89	10,328.93	0.616	6,363
May-13	7,313.57	9.50	7,304.07	0.616	4,499
Jun-13	4,450.87	13.29	4,437.58	0.616	2,734
Jul-13	4,287.56	11.25	4,276.31	0.616	2,634
Aug-13	3,602.12	18.17	3,583.95	0.616	2,208
Sep-13	3,201.70	17.05	3,184.65	0.616	1,962
Oct-13	1,716.05	25.84	1,690.21	0.616	1,041
Nov-13	1,859.43	25.01	1,834.42	0.616	1,130
Dec-13	1,894.68	27.47	1,867.21	0.616	1,150
Jan-14	2,011.12	27.76	1,983.36	0.616	1,222
Feb-14	2,031.05	23.83	2,007.22	0.616	1,236
Mar-14	4,432.01	20.07	4,411.94	0.616	2,718
Apr-14	4,179.22	17.85	4,161.37	0.616	2,563
May-14	3,845.88	18.42	3,827.46	0.616	2,358
Jun-14	2,277.72	20.11	2,257.61	0.616	1,391
Jul-14	2,630.98	10.72	2,620.26	0.616	1,614
Aug-14	2,273.64	15.43	2,258.21	0.616	1,391
Sep-14	3,163.00	17.08	3,145.92	0.616	1,938
Oct-14	1,643.28	19.80	1,623.48	0.616	1,000

Nov-14	2,392.03	20.57	2,371.46	0.616	1,461
Dec-14	2,994.20	20.67	2,973.53	0.616	1,832
Jan-15	10,675.96	4.78	10,671.18	0.616	6,573
Feb-15	12,514.75	1.41	12,513.19	0.616	7,708
Mar-15	15,947.32	0.03	15,947.29	0.616	9,824
Apr-15	15,181.51	-	15,181.51	0.616	9,352
May-15	6,761.60	11.86	6,749.74	0.616	4,158
Jun-15	4,202.96	12.45	4,190.51	0.616	2,581
Jul-15	4,237.50	14.39	4,223.11	0.616	2,601
Aug-15	3,826.03	14.91	3,811.12	0.616	2,348
Sep-15	3,594.66	14.44	3,580.22	0.616	2,205
Oct-15	2,293.09	19.33	2,273.76	0.616	1,401
Nov-15	959.20	25.50	933.70	0.616	575
Dec-15	1,761.69	25.14	1,736.55	0.616	1,070
Jan-16	6,557.32	15.97	6,541.35	0.616	4,029
Feb-16	7,417.21	10.98	7,406.23	0.616	4,562
Mar-16	14,622.68	1.92	14,620.76	0.616	9,006
2011 Vintage (01.04.2011-31.12.2011)	55,244.38	133.17	55,111.21	0.616	33,949
2012 Vintage (01.01.2012-31.12.2012)	93,623.16	133.60	93,489.56	0.616	57,590
2013 Vintage (01.01.2013-31.12.2013)	67,142.41	170.79	66,971.62	0.616	41,255
2014 Vintage (01.01.2014-31.12.2014)	33,874.13	232.31	33,641.82	0.616	20,723
2015 Vintage (01.01.2015-31.12.2015)	81,956.24	144.39	81,811.85	0.616	50,396
2016 Vintage (01.01.2016-31.03.2016)	26,710.41	28.87	26,681.54	0.616	16,436
Total	358,551	843	357,707.75	0.616	220,348

5.2 Project Emissions

There is no project emission resulting from the reservoir area of the Project Activity as the power density of the project is greater than 10W/m2. Accordingly, The Project Activity's power density was calculated as below:

=24,000,000 W/ 57,248.84 m2[9]

=419.2 W/m2

Therefore, PE= 0

5.3 Leakage

No leakage is to be accounted by the Project Activity. This is in line with the registered PD and applicable methodology ACM0002, "Consolidated methodology for grid connected electricity generation from renewable sources", version 9., Therefore, the leakage from the Project Activity is zero.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2011	33,949	0	0	33,949
2012	57,590	0	0	57,590
2013	41,255	0	0	41,255
2014	20,723	0	0	20,723

[9] Calculation is also available in the ER Calculations file.

2015	50,396	0	0	50,396
2016	16,436	0	0	16,436
Total	220,348	0	0	220,348