



MONITORING REPORT

Document Prepared by Sekans Danışmanlık

Project Title	Niksar Hydroelectric Power Plant
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Prepared By	SEKANS DANIŞMANLIK
Contact	Konaklar Mah.34330, Yeni Levent-İstanbul E-mail: sila@sekansdanismanlik.com Phone: +90 532 438 30 29

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Niksar Hydroelectric Power Plant which was developed by İÇTAŞ YENİLENEBİLİR ENERJİ ÜRETİM VE TİCARET A.Ş. is located at Niksar town of Tokat province and utilizes the Kelkit stream waterto generate electricity from hydropower.

The project is a run-of-river and the total installed capacity of the project is 41.560 MWm/40.161 MWe, consisting of 2 turbines, with a predicted net power supply to the grid of 215,203 MWh per annum. There is no new reservoir formation as it's just the collection of water. The water is collected as it just enables hourly regulation. The project is in operation since 24/05/2012¹. The estimated amount of GHG emission reduction is 114,753 tonnes CO₂ per year in the registered PDD. During its operation in this monitoring period, the actualized net electricity generation is 1,093,786.02MWh. 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 583,539 tonnes CO₂ for this monitoring period.

The purpose of the project activity is to generate power in an efficient, clean, reliable and sustainable way with maximum respect on social and environmental aspects and to reduce emissions by partially substituting the electricity supply of fossil fuel fired power plants in Turkey.

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

¹ The email titled as "May 2012 PMUM screenshot" is available to the DOE. PMUM (EPIAS) screenshot shows that the project started to feed electricity on 24/05/2012.

Vintage	Period	Total Days	Amount achieved during this monitoring period (tCO ₂ e)	Amount estimated ex ante (tCO ₂ e)	Difference (tCO ₂ e)	Difference (%)
2013	(01.08.2013-31.12.2013)	153	40,656	48,102	- 7,446	-15%
2014	(01.01.2014-31.12.2014)	365	35,255	114,753	- 79,498	-69%
2015	(01.01.2015-31.12.2015)	365	129,427	114,753	14,674	13%
2016	(01.01.2016-31.12.2016)	365	139,943	114,753	25,190	22%
2017	(01.01.2017-31.12.2017)	365	79,683	114,753	- 35,070	-31%
2018	(01.01.2018-31.12.2018)	365	79,580	114,753	- 35,173	-31%
2019	(01.01.2019-31.07.2019)	212	78,995	66,651	12,344	19%
Total		2,190	583,539	688,518	-104,979	-15%

As it may be seen through Table -1, a high increase of generation and amount of emission reduction was realized in 2016. The reason for that is the significant increase in rainfall in the region of the Project Activity for the same year.² Despite the fact that high increase in generation was seen also in 2015, the rainfall was not as much as it was in 2016. This difference may originate from saturation level of the soil which may result from the dormant vegetation and less water consumption in winter. Additionally, surface flow conditions of rainfall and the fall time differences have also an impact on the amount of water in rivers.

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

Table 2 - Monitoring timeline of the Project Activity

Date (Period)	Activity
15/12/2009	EPC Contract Date -(Construction Start Date)
24/05/2012	The commissioning of the 1 st turbine
08/06/2012	The commissioning of the 2 nd turbine
24/05/2012-31/07/2013	1 st Monitoring Period
01/08/2013-31/07/2019	2 nd Monitoring Period

² <https://mgm.gov.tr/veridegerlendirme/yillik-toplam-yagis-verileri.aspx> (Please see the graph “Karadeniz Bölgesi Yıllık Alansal Yağışları”)

The Project Activity consists of the main parts as of a diversion weir which diverts the water, a conveyance channel and the powerhouse where the turbines are located. The weir includes three spillway radial gates, a spill water crest and a fish gate on the left bank. The electricity is transmitted via 154 kV transmission lines through Köklüce transformer substations.

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

Table 3 - Technical description of the Project Activity³

Turbine brand	VOITH
Turbine model	S.L. E-20400 Tolosa
Serial numbers	19771 and 19772
Turbine type	Vertical Axis Francis
Number of units	2
Turbine Power	20.78 MWm/20.08MWe
Net-head	58.9
Max. flow	80 m3/s

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

³ The photographic evidences of turbine name plates are available to the DOE.

Organization name	İÇTAŞ YENİLENEBİLİR ENERJİ ÜRETİM VE TİCARET A.Ş. ⁴
Contact person	Ufuk Akbulut
Title	Investment Planning Director
Address	Kızılırmak Caddesi No: 31 Çankaya /ANKARA
Telephone	+90-312-285 83 63
Email	ufuk.akbulut@ic.com.tr

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	silad@sekansdanismanlik.com

1.5 Project Start Date.

The project start date is 24/05/2012⁵.

1.6 Project Crediting Period

The Project's crediting period type is renewable crediting. The Project's crediting period is ten years renewable twice: 24/05/2012 – 23/05/2022 (both days are included).

⁴ The trade registry is available to the DOE.

⁵ "May 2012 PMUM screenshot" which shows that the project started to feed electricity is available to the DOE.

1.7 Project Location

The Project Activity is located on the Kelkit stream in Tokat province in Turkey (Figure 1) . The Project Activity is approximately 50 km from the city of Tokat, and approximately 10 km from the town of Niksar. The nearest residential areas are the villages of Arpaören and Yarbaşı. The project area exists within the coordinates, 40°26'42.29"N and 37°05'25.74"E⁶.

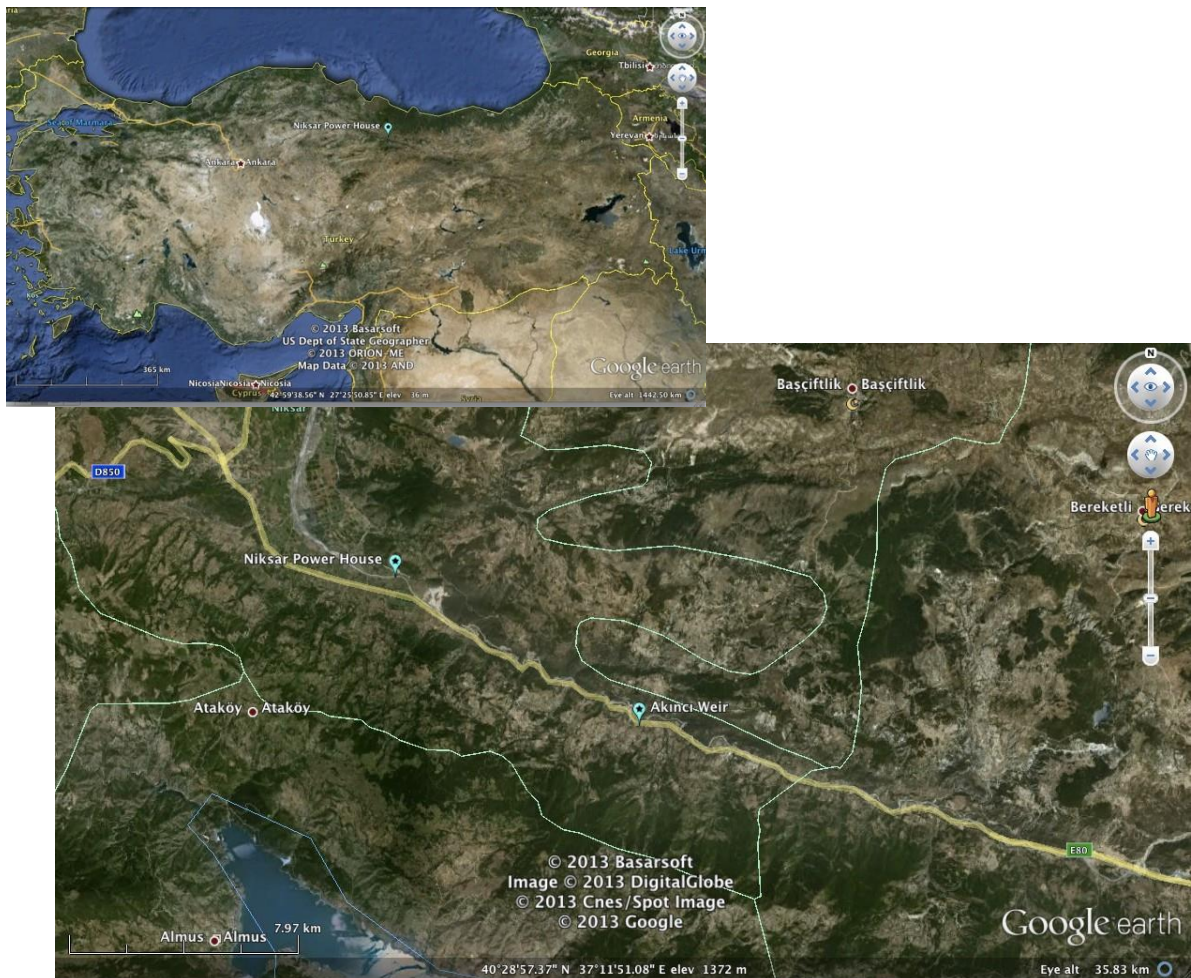


Figure 1. The location of the project

⁶ Google earth screenshot of the Project Activity is available to the DOE.

1.8 Title and Reference of Methodology

The following UNFFCC methodology and its related tools are utilized:

Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources." Version 13.0.0.

The Approved Methodology refers to the following tools:

- "Tool for the demonstration and assessment of additionality" (Version 07.0.0; EB 70 -Annex 8)
- "Tool to calculate the emission factor for an electricity system". (Version 03.0.0;EB70 -Annex 22)
- "Guidelines on the assessment of investment analysis" (Version 5; EB62-Annex 5)

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 215,203 MWh annually. The project contributes to the Sustainable Development Goal, Affordable and Clean Energy. During this monitoring period, the project has generated 1,093,786.02MWh as contributing to SGD 7 Affordable and Clean Energy.

The annual emission reduction estimated by the project is 114,753 tonnes CO₂eq, approximately. While this amount of emissions is mitigated, technology transfer is also realized as benefitting from hydropower. During this monitoring period, the project has contributed to SDG 13 Climate Action as reducing 583,539 tonnes CO₂.

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. As contributing to SDG 8 Decent Work and Economic Growth, 18 employees are working for the project activity.

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.

The project paid extra attention to maintaining social and environmental stability:

- The construction followed strict noise and dust standards to prevent any inconvenience to communities. Same standards are followed during the operation of the plant.
- The construction followed various strict standards for labor health and site safety.
- No pollution from any source is released into the river from the operation of the plant. Hazardous wastes are handled appropriately in closed containers and transported by licensed transporters to the licensed processing and disposal facilities.

- Wastewater is collected through within the septic tank and is transferred through the sewage truck⁷.
- Since the Project Activity is outside the municipal boundaries, the domestic wastes are taken by the vehicles of provincial special administration and taken to recycling site of Niksar Municipality⁸.
- Regarding the monitoring of “Water quality and quantity”, “Biodiversity and aquatic life”, streamgauge gauging station is built for the measurement of flow to assess the environmental flow. General directorate for state hydraulic works executes the monitoring and the Project complies with the regulations.⁹

2.2 Local Stakeholder Consultation

Local stakeholders have been contacted by the project owners to inform them about the Project and to gather their comments in the meeting hall of Halil Gürel Kırathanesi Arpaören Village, Niksar, Tokat province, at 11 am on October 4th 2007 Vis-à-vis. More than 80 people attended the meeting which included a presentation, a dialog session, and a Q&A session.

The common outcome of the stakeholder consultation was positive and stakeholders were in favour of the Project.

Local people were employed during construction and are being employed during operation. This contributes to local economy and leads to improvement in living standards.

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

⁷ The wastewater transfer receipts are available to the DOE

⁸ The records are available to the DOE.

⁹ Flow measurement (lifeline water) reports are available to the DOE.

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. 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.

The shareholder structure was changed on 09/06/2015 firstly, and the Project has been transferred to IC Group. On 27/07/2015, the main shareholder was changed as IC Elektrik Yatırım Holding A.S. The Project Proponent company name was firstly changed on 07/02/2014 as in the generation license and has become İÇTAŞ YENİLENEBİLİR ENERJİ ÜRETİM VE TİCARET A.Ş. on 08/03/2018, finally¹⁰.

Other entity involved in the Project was Ekobil Environmental Services and Consultancy in the project description. However, it's been changed as Sekans Danışmanlık after the first monitoring period.

3.2 Deviations

3.2.1 Methodology Deviations

There are no methodology deviations applied during this monitoring period.

3.2.2 Project Description Deviations

¹⁰ The trade registry is available to the DOE.

The shareholder structure of the Project Proponent was changed on 09/06/2015 firstly, and the Project has been transferred to IC Group. On 27/07/2015, the main shareholder was changed as IC Elektrik Yatırım Holding A.S. The Project Proponent company name was firstly changed on 07/02/2014 and has become İÇTAŞ YENİLENEBİLİR ENERJİ ÜRETİM VE TİCARET A.Ş. on 08/03/2018, finally.

Regarding, $EG_{PP-self\ consumption, y}$ and $EG_{PP-gross, y}$ the primary source was two TEIAS meter readings recorded at the monthly reading protocols and the secondary source was EPIAS web site screenshots in the PD. Since EPIAS web site screenshots show the exact invoiced generation and consumption values, the primary source has been determined as EPIAS web site screenshots for this monitoring period.

Other entity involved in the project was Ekobil Environmental Services and Consultancy in the project description. However, it has been changed as Sekans Danışmanlık after the 1st Monitoring Period.

3.3 Grouped Projects

This is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$FC_{i,y}$
Data unit	Volume Unit (cubic meter)
Description	Amount of fuel i consumed by relevant power plants in Turkey in years, 2009, 2010, 2011
Source of data	Turkish Electricity Transmission Company (TEIAS) website https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Annex 2-Table-1 in PD
Justification of choice of data or description of	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The

measurement methods and procedures applied	data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.
Purpose of Data	Calculation of baseline emissions
Comments	-.

Data / Parameter	NCVi,y
Data unit	GJ/Mass or Volume Unit
Description	Net Calorific Values for fossil fuel type i in year, for the years 2009, 2010 and 2011
Source of data	Turkish Electricity Transmission Company (TEİAŞ) website https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Annex-2-Table-5 in PD
Justification of choice of data or description of measurement methods and procedures applied	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.
Purpose of Data	Calculation of baseline emissions
Comments	Data used for the calculation of EFgrid,OM,Simple,y. As data on the NCV is not published directly on the TEİAŞ website, this data is calculated using the heating values of fuels and the volume or mass of fuels consumed for each year.

Data / Parameter	EF _{CO2,i,y}
Data unit	tCO2/GJ
Description	CO2 emission factor of fossil fuel type i in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value applied	Annex 2-Table-2 in PD
Justification of choice of data or description of	According to the “Tool to calculate the emission factor for an electricity system” version 03.0.0, if values provided by the fuel

measurement methods and procedures applied	supplier of the power plants in invoices or regional or national average defaults values are not available the IPCC default values at the lower limit of uncertainty must be used.
Purpose of Data	Data used both for the calculation of $EF_{grid,OM,Simple,y}$ and $EF_{EL,m,y}$
Comments	

Data / Parameter	EGy
Data unit	MWh
Description	Net electricity generated in the project electricity system in other words, net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units in year y
Source of data	Turkish Electricity Transmission Company (TEİAŞ) website https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
Value applied	Annex 2-Table 3 and Table 4 in PD
Justification of choice of data or description of measurement methods and procedures applied	TEİAŞ annually publishes official data regarding electricity generation. Average share of each source in the overall generation has been calculated.
Purpose of Data	Data used for the calculation of $EF_{grid,OM,Simple,y}$
Comments	-

Data / Parameter	EGm,y
Data unit	MWh
Description	Net electricity generated and delivered to the grid by power unit m in year y
Source of data	Data is extracted from the relevant annexes of the capacity projection reports for the years 2011 and 2012. https://www.epdk.org.tr/Detay/Icerik/3-0-66/elektrikuretim-kapasite-projeksiyonlari
Value applied	Annex 2-Table 8 in PD
Justification of choice of data or description of	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The

measurement methods and procedures applied	data published on the TEİAŞ website is the most up-to-date and reliable data available for the Turkish grid.
Purpose of Data	Data used for the calculation of $EF_{grid,BM,y}$
Comments	-

Data / Parameter	$\eta_{m,y}$
Data unit	-
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	The default values provided at the Annex 1 of the “Tool to calculate emission factor for an electricity sector (Version 03.0.0)” are used
Value applied	Annex 1 of the “Tool to calculate emission factor for an electricity sector (Version 03.0.0)”
Justification of choice of data or description of measurement methods and procedures applied	According to the “tool to calculate emission factor for an electricity system if documented manufacturer’s specifications or data from the utility, the dispatch centre or official records are not available then the default values given in annex 1 of the tool shall be used. The first two options are not available for the power plants supplying the Turkish grid, therefore the default values are used.
Purpose of Data	Data used for the calculation of $EF_{grid,BM,y}$
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PP-self\ consumption, y}$
Data unit	MWh
Description	Quantity of electricity imported by the power plant from the grid for self-consumption, in year y
Source of data	The primary source of data is EPIAS web site screenshots The secondary source of data is two TEİAŞ meter readings recorded at the monthly reading protocols, the column related to electricity obtained from the grid.

Description of measurement methods and procedures to be applied	Measurements are to be made by electricity meters that belong to the grid operator, TEİAŞ. The meters are in compliance with the collected data. Data is used to calculate the net electricity supplied to the grid.																
Frequency of monitoring/recording	Monthly readings																
Value monitored	<table><tr><td></td><td>MWh</td></tr><tr><td>01.08.2013-31.12.2013</td><td>40.61</td></tr><tr><td>01.01.2014-31.12.2014</td><td>357.60</td></tr><tr><td>01.01.2015-31.12.2015</td><td>63.21</td></tr><tr><td>01.01.2016-31.12.2016</td><td>51.24</td></tr><tr><td>01.01.2017-31.12.2017</td><td>133.77</td></tr><tr><td>01.01.2018-31.12.2018</td><td>150.58</td></tr><tr><td>01.01.2019-31.07.2019</td><td>14.46</td></tr></table>		MWh	01.08.2013-31.12.2013	40.61	01.01.2014-31.12.2014	357.60	01.01.2015-31.12.2015	63.21	01.01.2016-31.12.2016	51.24	01.01.2017-31.12.2017	133.77	01.01.2018-31.12.2018	150.58	01.01.2019-31.07.2019	14.46
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01.01.2014-31.12.2014	357.60																
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01.01.2016-31.12.2016	51.24																
01.01.2017-31.12.2017	133.77																
01.01.2018-31.12.2018	150.58																
01.01.2019-31.07.2019	14.46																
Monitoring equipment	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>EMH</td><td>EMH</td></tr></table>		Main Meter	Spare Meter	Name	Ana Sayaç	Yedek Sayaç	Brand	EMH	EMH							
	Main Meter	Spare Meter															
Name	Ana Sayaç	Yedek Sayaç															
Brand	EMH	EMH															

Serial Number	9798684	9798685
Accuracy class	0.2 S	0.2 S

Group 2:

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	EMH	EMH
Serial Number	9798686	9798687
Accuracy Class	0.2 S	0.2 S

Group 1 power and Group 2 power meters were changed on 23/11/2020.

The changed meters may be seen below:

Group 1:

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	ACTARIS	ACTARIS
Serial Number	53088751	53088752
Accuracy class	0.2 S	0.2 S

Group 2:

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	ACTARIS	ACTARIS
Serial Number	53088754	53088753
Accuracy Class	0.2 S	0.2 S

QA/QC procedures to be applied

- A spare meter is used for crosschecking the accuracy and both meters are calibrated if required.

	- EPIAS records are considered as the main source for the net electricity and the values are crosschecked with the Meter Reading Forms - 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 years¹¹. Since TEIAS meters are sealed by TEIAS, the project proponent cannot intervene with the devices. The periodic tests are executed on annual basis¹². - The initial calibration of the meters of the Project Activity was done on 26/04/2012. First Index protocol is available to the DOE. Se - During this monitoring period, the latest test meter test dates are 28/09/2017 and 10/10/2018. However, meters were changed on 23/11/2020.¹³
Purpose of the data	Calculation of net electricity supplied to the grid and thus baseline emissions
Calculation method	Direct continuous measurement
Comments	-

Data / Parameter	EG _{PP-gross, y}
Data unit	MWh
Description	Quantity of electricity produced by the power plant, in y
Source of data	The primary source of data is EPIAS web site screenshots The secondary source of data is two TEIAS meter readings recorded at the monthly reading protocols, the column related to electricity obtained from the grid.

¹¹ <http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch>

¹² The protocols of the tests are available to the DOE.

¹³ Test protocols are available to the DOE.

Description of measurement methods and procedures to be applied	Measurements are to be made by electricity meters that belong to the grid operator, TEİAŞ. The meters will be in compliance with the collected data. Data will be used to calculate the net electricity supplied to the grid.																		
Frequency of monitoring/recording	Monthly readings																		
Value monitored	<table><tr><td></td><td>MWh</td></tr><tr><td>01.08.2013-31.12.2013</td><td>76,290.00</td></tr><tr><td>01.01.2014-31.12.2014</td><td>66,478.86</td></tr><tr><td>01.01.2015-31.12.2015</td><td>242,800.98</td></tr><tr><td>01.01.2016-31.12.2016</td><td>262,510.36</td></tr><tr><td>01.01.2017-31.12.2017</td><td>149,578.13</td></tr><tr><td>01.01.2018-31.12.2018</td><td>149,400.50</td></tr><tr><td>01.01.2019-31.07.2019</td><td>147,524.20</td></tr></table>				MWh	01.08.2013-31.12.2013	76,290.00	01.01.2014-31.12.2014	66,478.86	01.01.2015-31.12.2015	242,800.98	01.01.2016-31.12.2016	262,510.36	01.01.2017-31.12.2017	149,578.13	01.01.2018-31.12.2018	149,400.50	01.01.2019-31.07.2019	147,524.20
	MWh																		
01.08.2013-31.12.2013	76,290.00																		
01.01.2014-31.12.2014	66,478.86																		
01.01.2015-31.12.2015	242,800.98																		
01.01.2016-31.12.2016	262,510.36																		
01.01.2017-31.12.2017	149,578.13																		
01.01.2018-31.12.2018	149,400.50																		
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	Main Meter	Spare Meter																	
Name	Ana Sayaç	Yedek Sayaç																	
Brand	EMH	EMH																	

Serial Number	9798684	9798685
Accuracy class	0.2 S	0.2 S

Group 2:

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	EMH	EMH
Serial Number	9798686	9798687
Accuracy Class	0.2 S	0.2 S

Group 1 power and Group 2 power meters were changed on 23/11/2020.

The changed meters may be seen below:

Group 1:

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	ACTARIS	ACTARIS
Serial Number	53088751	53088752
Accuracy class	0.2 S	0.2 S

Group 2:

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	ACTARIS	ACTARIS
Serial Number	53088754	53088753
Accuracy Class	0.2 S	0.2 S

QA/QC procedures to be applied

- A spare meter is used for crosschecking the accuracy and both meters are calibrated if required.

	- The EPIAS records are considered as the main source for the net electricity and the values are crosschecked with the Meter Reading Forms. - 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 years¹⁴. Since TEİAŞ meters are sealed by TEİAŞ, the project proponent cannot intervene with the devices. The periodic tests are executed on annual basis¹⁵. - During this monitoring period, the latest test meter test dates are 28/09/2017 and 10/10/2018.¹⁶
Purpose of the data	Calculation of net electricity supplied to the grid and thus baseline emissions
Calculation method	Direct continuous measurement
Comments	-

Data / Parameter	Cap _{PJ}
Data unit	W
Description	Installed capacity of the hydropower plants after the implementation of the Project Activity.
Source of data	Project site computers with SCADA system and the turbine name plates.
Description of measurement methods and procedures to be applied	Observed via the SCADA system of the Project Activity
Frequency of monitoring/recording	Once for each monitoring period
Value monitored	40,161,000
Monitoring equipment	SCADA system of the Project Activity

¹⁴ <http://www.mevzuat.gov.tr/Metin.Aspix?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch>

¹⁵ The protocols of the tests are available to the DOE.

¹⁶ Test protocols are available to the DOE.

QA/QC procedures to be applied	Can be confirmed also by the parameter readings on the design plates of each turbine and by summing the two units
Purpose of the data	Calculation of project emissions
Calculation method	N/A
Comments	-

Data / Parameter	AP _J
Data unit	m ²
Description	Area of the reservoir measured in the surface of the water, after the implementation of the Project Activity, when the reservoir is full. Indirectly measured based on the reservoir area map provided in Annex 5 of the registered PD. The map was drawn by a third party (a project company)
Source of data	Surface area determined using the lake surface area map provided in Annex-5 of the registered PD.
Description of measurement methods and procedures to be applied	The reservoir area corresponding to maximum operational level has been determined via the topographic map showing the lake area, presented in Annex 5 of the registered PD.
Frequency of monitoring/recording	Once during each monitoring period
Value monitored	Current area is 160,759 ¹⁷
Monitoring equipment	Scada system water level readings
QA/QC procedures to be applied	Can be checked and compared to satellite imagery available by Google Earth.
Purpose of the data	Calculation of project emissions
Calculation method	N/A
Comments	Since there is no capacity increase, the same installed capacity during the registration is valid. Therefore, no annual electronic

¹⁷ Satellite imagery available by Google Earth for the collected water has been provided to the DOE.

spreadsheet has been recorded for the area of the reservoir and the reservoir area corresponding to maximum operational level has been taken into consideration.

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:

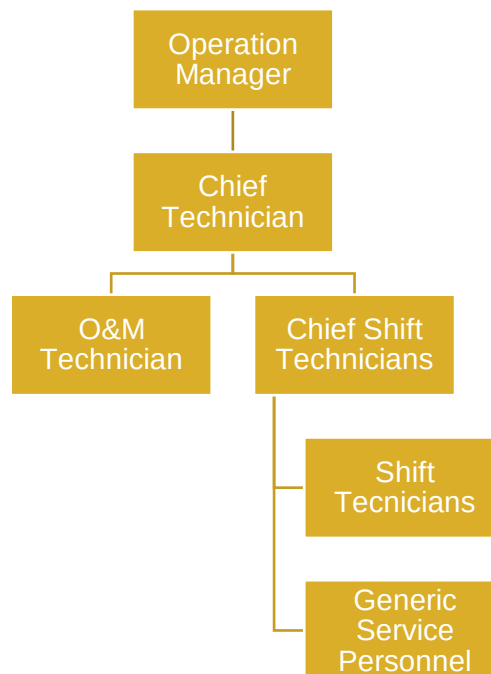


Figure 2. The management structure for the plant operation

In total, eighteen employees are working for the Project Activity. The operation manager is responsible for the whole management of the Project Activity and the 14 technicians are

responsible for the implementation of the Project Activity. In addition to the technicians, there are three generic service personnel working for the plant.

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 EPIAS records Net electricity exported is crosschecked with the Meter Reading Forms (OSF). EPIAS is the financial settlement centre of TEIAS¹⁸. 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 EPIAS 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

¹⁸ 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 ₂ e/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 0.5332 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]
Aug-13	14,649.13	8.33	14,640.80	0.5332	7,806
Sep-13	16,164.04	5.46	16,158.58	0.5332	8,616
Oct-13	13,092.80	9.84	13,082.96	0.5332	6,976
Nov-13	13,549.98	11.78	13,538.20	0.5332	7,219
Dec-13	18,834.05	5.20	18,828.85	0.5332	10,040
Jan-14	11,193.83	19.57	11,174.26	0.5332	5,958
Feb-14	13,126.06	10.45	13,115.61	0.5332	6,993
Mar-14	6,353.35	23.77	6,329.58	0.5332	3,375
Apr-14	2,399.38	44.90	2,354.48	0.5332	1,255
May-14	3,988.72	36.20	3,952.52	0.5332	2,107
Jun-14	5,300.83	23.11	5,277.72	0.5332	2,814
Jul-14	6,757.58	17.07	6,740.51	0.5332	3,594
Aug-14	5,515.73	20.54	5,495.19	0.5332	2,930
Sep-14	4,593.56	28.51	4,565.05	0.5332	2,434
Oct-14	314.20	52.64	261.56	0.5332	139
Nov-14	293.26	54.66	238.60	0.5332	127
Dec-14	6,642.36	26.18	6,616.18	0.5332	3,528
Jan-15	16,841.79	12.05	16,829.74	0.5332	8,974
Feb-15	20,499.05	2.36	20,496.69	0.5332	10,929
Mar-15	27,093.48	0.52	27,092.96	0.5332	14,446
Apr-15	24,764.97	0.82	24,764.15	0.5332	13,204
May-15	23,032.24	5.20	23,027.04	0.5332	12,278
Jun-15	24,529.40	0.06	24,529.34	0.5332	13,079
Jul-15	19,843.42	3.50	19,839.92	0.5332	10,579
Aug-15	21,798.27	0.21	21,798.06	0.5332	11,623
Sep-15	15,157.85	11.83	15,146.02	0.5332	8,076
Oct-15	19,584.39	4.02	19,580.37	0.5332	10,440
Nov-15	10,871.70	14.22	10,857.48	0.5332	5,789
Dec-15	18,784.42	8.42	18,776.00	0.5332	10,011
Jan-16	12,869.38	24.93	12,844.45	0.5332	6,849
Feb-16	22,209.43	5.43	22,204.00	0.5332	11,839
Mar-16	24,833.95	2.77	24,831.18	0.5332	13,240
Apr-16	26,015.41	0.04	26,015.37	0.5332	13,871
May-16	28,880.75	0.20	28,880.55	0.5332	15,399
Jun-16	26,735.82	0.03	26,735.79	0.5332	14,256

Jul-16	22,753.13	0.13	22,753.00	0.5332	12,132
Aug-16	22,130.25	0.19	22,130.06	0.5332	11,800
Sep-16	20,530.00	0.25	20,529.75	0.5332	10,946
Oct-16	22,018.08	0.00	22,018.08	0.5332	11,740
Nov-16	10,393.89	15.88	10,378.01	0.5332	5,534
Dec-16	23,140.27	1.39	23,138.88	0.5332	12,338
Jan-17	16,268.43	4.70	16,263.73	0.5332	8,672
Feb-17	12,922.93	8.98	12,913.95	0.5332	6,886
Mar-17	7,382.23	21.04	7,361.19	0.5332	3,925
Apr-17	5,991.52	24.05	5,967.47	0.5332	3,182
May-17	6,900.66	22.31	6,878.35	0.5332	3,668
Jun-17	14,589.99	6.12	14,583.87	0.5332	7,776
Jul-17	16,023.25	4.76	16,018.49	0.5332	8,541
Aug-17	13,960.59	6.45	13,954.14	0.5332	7,440
Sep-17	13,590.16	7.15	13,583.01	0.5332	7,242
Oct-17	13,643.90	9.54	13,634.36	0.5332	7,270
Nov-17	10,657.50	16.51	10,640.99	0.5332	5,674
Dec-17	17,646.97	2.16	17,644.81	0.5332	9,408
Jan-18	18,533.58	2.82	18,530.76	0.5332	9,881
Feb-18	11,424.60	12.09	11,412.51	0.5332	6,085
Mar-18	17,716.14	6.72	17,709.42	0.5332	9,443
Apr-18	14,131.73	9.50	14,122.23	0.5332	7,530
May-18	5,671.83	30.46	5,641.37	0.5332	3,008
Jun-18	5,751.07	21.18	5,729.89	0.5332	3,055
Jul-18	15,992.61	4.35	15,988.26	0.5332	8,525
Aug-18	13,593.10	10.61	13,582.49	0.5332	7,242
Sep-18	15,250.08	4.71	15,245.37	0.5332	8,129
Oct-18	6,515.84	24.36	6,491.48	0.5332	3,461
Nov-18	7,052.76	17.61	7,035.15	0.5332	3,751
Dec-18	17,767.16	6.17	17,760.99	0.5332	9,470
Jan-19	25,032.48	0.54	25,031.94	0.5332	13,347
Feb-19	22,002.39	0.00	22,002.39	0.5332	11,732
Mar-19	20,363.80	2.73	20,361.07	0.5332	10,857
Apr-19	22,273.63	0.95	22,272.68	0.5332	11,876
May-19	25,126.85	0.10	25,126.75	0.5332	13,398
Jun-19	15,951.37	7.18	15,944.19	0.5332	8,501
Jul-19	16,788.14	2.96	16,785.18	0.5532	9,286
2013 Vintage (01.08.2013- 31.12.2013)	76,290.00	40.61	76,249.39	0.5332	40,656

2014 Vintage (01.01.2014- 31.12.2014)	66,478.86	357.60	66,121.26	0.5332	35,255
2015 Vintage (01.01.2015- 31.12.2015)	242,800.98	63.21	242,737.77	0.5332	129,427
2016 Vintage (01.01.2016- 31.12.2016)	262,510.36	51.24	262,459.12	0.5332	139,943
2017 Vintage (01.01.2017- 31.12.2017)	149,578.13	133.77	149,444.36	0.5332	79,683
2018 Vintage (01.01.2018- 31.12.2018)	149,400.50	150.58	149,249.92	0.5332	79,580
2019 Vintage (01.01.2019- 31.07.2019)	147,538.66	14.46	147,524.20	0.5332	78,995
Total	1,094,597.49	811.47	1,093,786.02	0.5332	583,539

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:

$$= 40,161,000 \text{ W} / 160,759^{19} \text{ m}^2^{20}$$

$$= 249.8 \text{ W/m}^2$$

Therefore, PE= 0

¹⁹ The current area has been considered for the calculation.

²⁰ Calculation is also available in the ER Calculations file.

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 13. Therefore, the leakage from the Project Activity is zero.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2013	40,656	0	0	40,656
2014	35,255	0	0	35,255
2015	129,427	0	0	129,427
2016	139,943	0	0	139,943
2017	79,683	0	0	79,683
2018	79,580	0	0	79,580
2019	78,995	0	0	78,995
Total	583,539	0	0	583,539