



Verified Carbon Standard

NIKSAR HYDROELECTRIC POWER PLANT

Project title	Niksar Hydroelectric Power Plant
Project ID	1019
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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 water to 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 CO_{2e} per year in the registered PDD. During its operation in this monitoring period, the actualized net electricity generation is 62,140.02 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 33,132 tonnes CO_{2e} 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.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
<i>Validation</i>	24-May-2012 / 23-May-2022	VCS	TÜV Rheinland Energie und Umwelt GmbH	Ten years
<i>Verification</i>	24-May-2012 / 31-Jul-2013	VCS	TÜV Rheinland Energie und Umwelt GmbH	1.2 years

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.

Verification	01-Aug-2013 / 31-Jul-2019	VCS	Re Carbon Gözetim Denetim ve Belgelendirme Ltd. Şti.	6 years
Verification	01-Aug-2019 / 31-Oct-2021	VCS	RINA Services S.p.A.	2.2 years
Verification	01-Nov-2021 / 23-May-2022	VCS	RINA Services S.p.A.	0.6 years

1.3 Sectoral Scope and Project Type

Sectoral scope ²	1
Project activity type	“Energy industries (renewable - / nonrenewable sources)”

1.4 Project Proponent

Organization name	İÇTAŞ YENİLENEBİLİR ENERJİ ÜRETİM VE TİCARET A.Ş. ³
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

1.5 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	+(90) 532 438 30 29
Email	silad@sekansdanismanlik.com

² Projects, activities, or methodologies may be developed under any of the 16 VCS sectoral scopes: <https://verra.org/programs/verified-carbon-standard/vcs-program-details/#sectoral-scopes>

³ The trade registry is available to the DOE.

1.6 Project Start Date

Project start date	24-May-2012
Justification	The date is the start date of the commissioning of the 1 st turbine of the project.

1.7 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☐ Ten years, fixed ☒ Other – Ten years, renewable twice
Start and end date of first or fixed crediting period	The 1 st Crediting Period: 24-May-2012 / 23-May-2022

1.8 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 activity coordinates are given below:

Table 1 - The location of the major project components⁴

Structure	N (Latitude)	E (Longitude)
Regulator	40°26'48.408"	37°4'49.89"
HEPP	40°29'41.3592"	36°58'37.0344"

⁴ General Layout Plan of Niksar HEPP (Approved by the General Directorate of State Hydraulic Works - DSI).

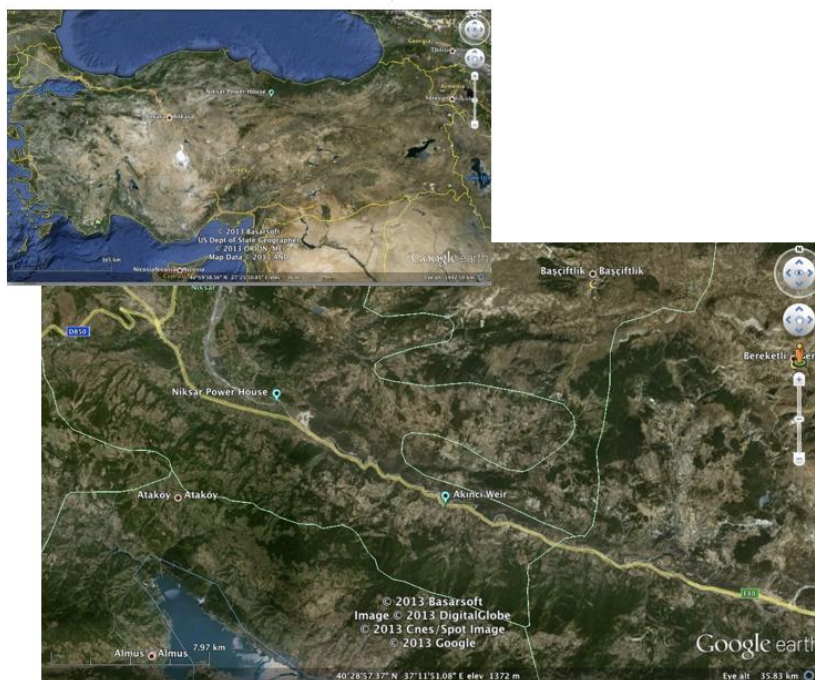


Figure 1. The location of the project

1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0002	Consolidated baseline methodology for grid-connected electricity generation from renewable sources	13.0 ⁵
Tool	Tool-07	Tool to calculate the emission factor for an electricity system	03.0 ⁶
Tool	Tool-01	Tool for the demonstration and assessment of additionality	0.7 ⁷
Guideline	-	Guidelines on the assessment of investment analysis	05 ⁸

⁵ <https://cdm.unfccc.int/UserManagement/FileStorage/DYPFI935XBG274NWH6O8CM1KEZR0VU>

⁶ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v3.0.0.pdf>

⁷ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

⁸ https://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.11.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

1.11.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

1.11.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

1.12 Sustainable Development Contributions

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. During this monitoring period, the project generated 62,140.02 MWh of electricity.

The project's emission reductions during this monitoring period are 33,132 tonnes CO₂eq.

During construction and operational period, the project has created employment opportunities for the local community. 18 personnel are working for the project activity.

Table 2: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	Prevented 62,140.02 MWh electricity generation from fossil fuels.	Prevented the generation of 1,781,627.45 MWh electricity generation from fossil fuels.
2)	8.2	Job creation for local people	Job creation for local people in a high value-added sector	During construction and operational period, the project has created employment opportunities for the local community. The project contributes to the economic development of the region by providing sustainable energy resources. Job has been created for 18 employees.	As contributing to SGD 8 Decent Work and Economic Growth, one Operation Manager is responsible for the Niksar HPP. Besides this, fourteen technicians and three generic service personnel are working in for the Project Activity. However, 18 employees are recorded under the Project Activity.

3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By producing electricity from hydro energy, the project activity has prevented the release of 33,132 tonnes of carbon into the atmosphere during the reporting period.	Prevented the release of 950,301 tonnes of carbon into the atmosphere.
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1.13 Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	N/A
Legal or customary tenure/access rights	N/A
Stakeholder diversity and changes over time	N/A
Expected changes in well-being	N/A
Location of stakeholders	N/A
Location of resources	N/A

The stakeholder structure has not changed since validation. Details of the stakeholder structure are given in section 2.1.2.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	The contact information of the plant responsible exists 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
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	community. The project owner has established very good communication and relations with the local people.
Date(s) of 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 Kiraathanesi Arpaören Village, Niksar, Tokat province, at 11 am on October 4 th , 2007, Vis-à-vis. More than 80 people attended the meeting which included a presentation, a dialog session, and a Q&A session.
Communication of monitored results	Stakeholders can directly reach the plant manager if they have any complaints/opinions. In cases where stakeholders need to be informed, the project owner informs the stakeholders through the headman.
Consultation records	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. No complaints occurred during this monitoring period.
Stakeholder input	In general, stakeholders are satisfied with the project. They do not have any negative comments or complaints about the project.

2.1.3 Free, Prior, and Informed Consent

Consent	Relevant permits were obtained during the validation period.
Outcome of FPIC	The project activity did not damage land, did not relocate people without their consent, and did not forcibly physically or economically displace people.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
No negative inputs have been received during this monitoring period.	It is important for the project developer to monitor the ongoing stakeholder engagement process to ensure that consultation and disclosure efforts are effective and that

stakeholders submitting complaints are meaningfully consulted throughout the process. Therefore, a stakeholder engagement plan is created by the project developer. The facility manager's contact information is available at Mukhtar, the project developer and the local people are in constant contact. The project developer regularly checks with the Mukhtar whether there are any complaints or requests. Any complaints or needs of the local community can be addressed directly to the project developer and appropriate contributions or improvements will be made to the local community.

2.1.5 Public Comments

Summary of comments received	Actions taken
There hasn't been any public consultation during this monitoring period.	N/A

2.2 Risks to Stakeholders and the Environment

	Risk identified	Mitigation or preventative measure taken
Risks to stakeholder participation	No risk identified	Stakeholders are involved in every stage of informing about the project activity. The complaint mechanism is fully functioning.
Working conditions	No risk identified	All necessary training regarding the health and safety of employees is provided. Child labor as defined in the ILO Minimum Age Convention is not permitted. The Project Developer ensures that there is no forced labor, and that all employment complies with national occupational and occupational health and safety

		laws, obligations under international law, and the principles and standards and essential conventions of the International Labor Organization (ILO).
Safety of women and girls	No risk identified	The project does not endanger the safety of girls and women.
Safety of minority and marginalized groups, including children	No risk identified	The project does not jeopardize the safety of minorities and isolated groups, including children.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	No risk identified	The project is a hydro energy project. By evaluating the environmental impacts of the project activity, "EIA Not Required Certificate" was received from the Ministry of Environment and Urbanization on 22-Nov-2007.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

Discrimination and sexual harassment	The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis.
Management experience	No new organization was involved in the project design and implementation.
Gender equity in labor and work	The project does not reduce access to or control of resources for women. The project does not involve in any form discrimination in any kind of form. The project respects the employees' freedom of association and their right to collective bargaining and is not complicit in restrictions of these freedoms and rights.
Human trafficking, forced labor, and child labor	Child labour, as defined by the ILO Minimum Age Convention, is not allowed. The Project Developer ensures that there is no forced labour, and that all employment is in compliance with

	national labour and occupational health and safety laws, with obligations under international law, and consistency with the principles and standards embodied in the International Labour Organization (ILO) fundamental conventions.
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2.3.2 Human Rights

Turkey is a party to European Convention on Human Rights since 18-May-1954.⁹

The project owner respects internationally proclaimed human rights including dignity, cultural property and uniqueness of indigenous people. The project is not complicit in Human Rights abuses.

2.3.3 Indigenous Peoples and Cultural Heritage

There is no resettlement issue associated with the Project. There were no houses in the project area, thus the project did not cause any resettlement.

2.3.4 Property Rights

All permits for the project site were obtained during the validation period.

Disputes over rights to territories and resources	N/A
Respect for property rights	N/A

2.3.5 Benefit Sharing

There is no benefit sharing in the project activity.

2.4 Ecosystem Health

“EIA not Required Certificate” from Ministry of Environment and Urbanization was taken on 22-Nov-2011 as assessing the environmental impacts of the project activity.

	Risk identified	Mitigation or preventative measure taken during the monitoring period
Impacts on biodiversity and ecosystems	No risk identified	The project is a hydro energy project.

⁹Please See Official Website of Ministry of Foreign Affairs of Turkey: <http://www.mfa.gov.tr/the-european-convention-on-human-rights.en.mfa>

Impacts on aquatic life and fishery	Negative impacts on aquatic life and fishery	The fish passage at the power plant ensures that fish continue their migration routes uninterrupted and thus their reproductive cycles are not harmed. Since the project includes a small weir instead of a lake, there is no impact on flora, habitats and biotopes as a result of microclimate change. A minimum amount of water is released from the weir in order to protect the aquatic life in the riverbed.
Soil degradation and soil erosion	No risk identified	The project is a hydro energy project.
Water consumption and stress	No risk identified	The project is a hydro energy project.
Usage of fertilizers	No risk identified	The project is a hydro energy project.

2.4.1 Rare, Threatened, and Endangered species

Species or habitat	There aren't any endangered species identified as potentially present within the Project boundary (including those that may route through the area). The Project does not potentially impact other areas where endangered species may be present through transboundary affects.
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2.4.2 Introduction of species

N/A

2.4.3 Ecosystem conversion

The project is not an "Afforestation, Reforestation and Revegetation" (ARR), "Agricultural Land Management" (ALM), "Wetlands Restoration and Conservation" (WRC) or "Avoided Conversion of Grasslands and Shrublands" (ACoGS) project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The Niksar Hydroelectric Power Plant project includes the construction and operation of a 41.560 MWm/40.161 MWe run-off-river type hydroelectric power plant in Niksar Town of Tokat Province and utilizes the Kelkit stream water to generate electricity from hydropower.

The Project Activity is comprised of the following main parts: a diversion weir (named Akinci weir) to divert the water, a conveyance channel and the powerhouse where the turbines are housed. Water is being collected in a concrete gravity diversion weir (31 m crest length, 20 m height). The weir also includes three spillway radial gates, a spill water crest and a fish gate on the left bank. Water enters the weir from an intake structure and leaves the weir from the outlet gates into a 12 km conveyance channel and two units of 100 m penstocks. A gross head of 59.44 m is being formed (net head 58.20 m) and water is being discharged into two Francis turbines, which are contained within a 47.50 x 20 x 36 m powerhouse. The electricity is transmitted via 36 kV transmission lines through Köklüce transformer substations, which are approximately 4 km away from the project site.

The net electricity production (delivered to the grid after losses and consumption in the plant) from the plant is estimated to be 215,203 MWh per annum. The amount of electricity generated by the project is not influenced by factors outside the project boundary such as other power plants or demand for electricity. Regarding the actual operation of the project activity, the temporary acceptance protocol signed by the Ministry of Energy and Natural Resources is dated 24-May-2012 for the commissioning of 1st turbine. The 2nd turbine was put into operation with the temporary acceptance protocol signed with the Ministry of Energy and Natural Resources on 08-June-2012.

Table 3 – Timeline of the Project Activity

Date	Action
26/11/2005	Project owner was invited to the auction for the license
24/03/2006	Main water Usage agreement signed
21/09/2006	Production License number EÜ/921-1/722 issued to Selen Elektrik previous title holder of the project
15/11/2006	Quotation taken for a group of project including Niksar HPP

05/07/2007	First Amendment Made to the project's production license and capacity increased to 40.161 MWe
28/09/2007	LSC announced on Local Newspaper (Yeni Tokat)
01/11/2007	Project Introduction File (PIF or PTD) including the EIA on Niksar HEPP Finalized
04/11/2007	Local Stake Holder Consultation (LSC) Meeting held at the project site
22/11/2007	EIA process not needed certification presented by the Ministry of Environment and Forestry (name changed as Ministry of Environment and Urban Planning)
01/04/2009	Feasibility Study Report (FSR)
19/06/2009	Approval Letter for the revised Feasibility Study
17/09/2009	First Amendment made to the water usage agreement due to capacity increase
28/11/2009	Final amendment made to the water usage agreement due to title of the owner changed to Niksar Enerji Üretim Ltd. Şti.
02/11/2009	Grid connection and Usage Agreement with TEIAS
11/11/2009	Final Amendment made and the title of the owner changed to Niksar Enerji Üretim Ltd. Şti.
15/12/2009	EPC Contract Signed
16/12/2009	Loan agreement signed
02/02/2010	Construction Start Date
24/02/2010	The Electromechanical Equipment Purchase Contract Signed
09/03/2010	Forest Authority issued forest permit so that the land use can be changed, and project can be implemented
10/03/2010	The first payment made to the turbine provider
23/05/2012	Commissioning of the 1 st turbine
24/05/2012	1 st Crediting Period start date
24/05/2012	1 st Monitoring Period start date
08/06/2012	Commissioning of the 2 nd turbine

31/07/2013	1 st Monitoring Period end date
01/08/2013 – 31/07/2019	2 nd Monitoring Period
01/08/2019 – 31/10/2021	3 rd Monitoring Period
01/11/2021 – 23/05/2022	4 th Monitoring Period
23/05/2022	1 st Crediting Period end date

Table 4 – Technical specifications of Niksar HPP

Component or parameter	
Drainage area	8.251,00 km ²
Annual flow	2.219 hm ³
Maximum flow	358.25 m ³ /s
Minimum flow	11.61 m ³ /s
Average flow	70.35 m ³ /s
Thalweg elevation of the weir	346.50 m
Crest elevation of the weir	357.00 m
Height of weir	20.00 m
Spillway capacity	998.70 m ³ /s
Max. operation level	365.00 m
Tailwater level	300.30 m
Conveyance channel	12.014 m
Penstock lengths	100.00 m
Penstock diameters	3.20 m
Project design capacity	80 m ³ /s
Gross head	59.44 m
Net-head	58.20 m
Turbine type	Francis
Number of units	2
Capacity of each unit	40.00 m ³ /s
Installed capacity	40.16 MW
Total energy (gross) (After lifeline water Change)	224,850 GWh
Total Energy (net)	215,203 GWh

3.2 Deviations

3.2.1 Methodology Deviations

There are no methodological deviations applied during this monitoring period.

3.2.2 Project Description Deviations

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 first 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.

The 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.

It's stated in Project Description that a new reservoir area is formed. However, there is no new reservoir formation as it's just the collection of water. The water is collected as it just enables hourly.

The power meters for both Group 1 and Group 2 were initially ACTARIS brand meters. Each group consisted of a main meter and a spare meter. In Group 1, the main meter had the serial number "5308751", while the spare meter had the serial number "5308752". Both meters belonged to accuracy class 0.2S. In Group 2, the main meter was identified with the serial number "5308754", and the spare meter had the serial number "5308753". These meters also had an accuracy class of 0.2S.

On November 23, 2020, the power meters for both groups were replaced. The new meters installed were EMH brand. For Group 1, the new main meter has the serial number "9798684", and the spare meter has the serial number "9798685". Similarly, for Group 2, the new main meter is assigned serial number "9798686", and the spare meter's serial number is "9798687". The accuracy class of the new meters remained 0.2S for all meters.

The project coordinates in the approved PD are 40°26'37.98"N and 37°4'47.72"E for the weir; 40°29'27.38"N and 36°58'34.79"E for the powerhouse. The coordinates in the

registered PD have been replaced with the coordinates in the General Layout Plan of Niksar HEPP (Approved by the General Directorate of State Hydraulic Works - DSI) report. The new coordinates are 40°26'48.408"N and 37°4'49.89"E for the regulator; 40°29'41.3592"N and 36°58'37.0344"E for the powerhouse. There are very small distance differences between the old coordinates and the new coordinates.

3.3 Grouped Projects

The project activity is not a grouped project.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes ☒ No

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 (TEİAŞ) 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 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 / Parameter	NCV _{i,y}
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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 EF _{grid,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	tCO ₂ /GJ
Description	CO ₂ 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 measurement methods and procedures applied	According to the “Tool to calculate the emission factor for an electricity system” version 03.0.0, if values provided by the fuel 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	EG_y
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	EG_{m,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-projeeksiyonlari
Value applied	Annex 2-Table 8 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	Data used for the calculation of EF _{grid,BM,y}
Comments	-

Data / Parameter	η_{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 TEIAS 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

	MWh
01.11.2021-31.12.2021	72.05
01.01.2022-23.05.2022	61.00

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.

Current power meters:

Group 1:

	Main Meter	Spare Meter
Name	Ana Sayaç	Yedek Sayaç
Brand	EMH	EMH
Serial Number	9798684	9798685
Accuracy Class	0.2S	0.2S

Group 2:

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

Group 1 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	0.2S	0.2S

	Group 2: <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</td><td>53088754</td><td>53088753</td></tr><tr><td>Accuracy Class</td><td>0.2S</td><td>0.2S</td></tr></table>		Main Meter	Spare Meter	Name	Ana Sayaç	Yedek Sayaç	Brand	ACTARIS	ACTARIS	Serial Number	53088754	53088753	Accuracy Class	0.2S	0.2S
	Main Meter	Spare Meter														
Name	Ana Sayaç	Yedek Sayaç														
Brand	ACTARIS	ACTARIS														
Serial Number	53088754	53088753														
Accuracy Class	0.2S	0.2S														
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 - TEİAŞ is responsible for calibration and maintenance of the devices. The periodic calibration or maintenance is under the responsibility of TEİAŞ and has been fixed as once in 10 years¹⁰. Since TEİAŞ meters are sealed by TEİAŞ, the project proponent cannot intervene with the devices. The periodic tests are executed on annual basis¹¹.															
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.

¹⁰ <http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch>

¹¹ The protocols of the tests 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 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>01.11.2021-31.12.2021</td><td>2,316.69</td></tr><tr><td>01.01.2022-23.05.2022</td><td>59,956.39</td></tr></table>		MWh	01.11.2021-31.12.2021	2,316.69	01.01.2022-23.05.2022	59,956.39																											
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01.01.2022-23.05.2022	59,956.39																																	
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. Current 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><tr><td>Serial Number</td><td>9798684</td><td>9798685</td></tr><tr><td>Accuracy Class</td><td>0.2S</td><td>0.2S</td></tr><tr><td>The Latest Test Dates of the Meter</td><td>23/11/2020, 10/08/2022</td><td>23/11/2020, 10/08/2022</td></tr></table> Group 2: <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><tr><td>Serial Number</td><td>9798686</td><td>9798687</td></tr><tr><td>Accuracy Class</td><td>0.2S</td><td>0.2S</td></tr></table>		Main Meter	Spare Meter	Name	Ana Sayaç	Yedek Sayaç	Brand	EMH	EMH	Serial Number	9798684	9798685	Accuracy Class	0.2S	0.2S	The Latest Test Dates of the Meter	23/11/2020, 10/08/2022	23/11/2020, 10/08/2022		Main Meter	Spare Meter	Name	Ana Sayaç	Yedek Sayaç	Brand	EMH	EMH	Serial Number	9798686	9798687	Accuracy Class	0.2S	0.2S
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QA/QC procedures to be applied																		
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Purpose of the data																		
Calculation of net electricity supplied to the grid and thus baseline emissions																		

¹² <http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch>

¹³ The protocols of the tests are available to the DOE.

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
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 ¹⁴
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 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 Project Proponent is responsible for the overall management of the monitoring procedures including recording, data collection, calculating emission reductions and project emissions.

¹⁴ Satellite imagery available by Google Earth for the collected water has been provided to the DOE.

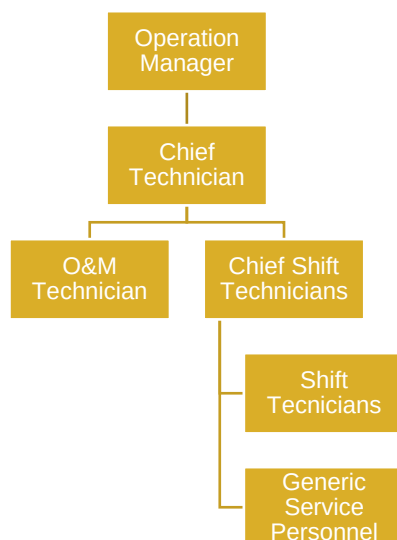


Figure 3. The organization chart of the project activity

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. All 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. The periodical calibration or maintenance is under the responsibility of TEIAS. The calibration of meters is done every ten years. The meter tests are carried out every two years. Since TEIAS meters are sealed by TEIAS, the project proponent cannot intervene with the devices.

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 EPIAS records. Net electricity exported is crosschecked with OSF Forms. EPIAS is the financial settlement center of TEIAS¹⁵. The OSF are filled by the project owner and approved by the governmental officers. Additionally, the remote reading by the

¹⁵ PMUM has been replaced by EPIAS as of 01/09/2015 in Turkey during the verification period. Retrospective data is accessible via EPIAS.

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. All data collected as part of monitoring is being archived electronically by the Project Proponent and be kept at least for 2 years after the end of the last crediting period.

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.

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 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 CO₂ 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” (tCO₂/MWh)

$$BE_y = EGPJ, y * EF_{grid, CM, y} \quad \text{Equation (2)}$$

$EF_{grid,CM,y}$ value is fixed as 0.5332 tCO₂/MWh for during the crediting period. Table 5 shows the baseline emissions for the verification period:

Table 5 - Baseline emissions

Month	(A) Electricity supplied to the grid [MWh]	(B) Electricity consumed 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 [tCO ₂ -eq]
Nov-21 (01-30/11/2021)	1,311.67	29.63	1,282.04	0.5332	684
Dec-21	1,005.02	42.42	962.60	0.5332	513
Jan-22	7,758.98	26.48	7,732.50	0.5332	4,123
Feb-22	19,024.20	3.09	19,021.11	0.5332	10,142
Mar-22	9,672.75	17.76	9,654.99	0.5332	5,148
Apr-22	13,265.74	9.03	13,256.71	0.5332	7,068
May-22 (01-23/05/2022)	10,234.72	4.65	10,230.08	0.5332	5,455
2021 Vintage (01.11.2021-31.12.2021)	2,316.69	72.05	2,244.64	0.5332	1,196
2022 Vintage (01.01.2022-23.05.2022)	59,956.39	61.00	59,895.38	0.5332	31,936
Total	62,273.07	133.05	62,140.02	0.5332	33,132

5.2 Project Emissions

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

The power density of the project activity (PD) is calculated as follows:

$$PD = CAP_{PJ} - CAP_{BL} / A_{PJ} - A_{BL}$$

where:

PD = Power density of the project activity (W/m²)

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 (m²).

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 (m²). For new reservoirs, this value is zero.

$$Cap_{PJ} = 40,161,000 \text{ W}$$

$$Cap_{BL} = 0.0 \text{ W}$$

$$A_{PJ} = 160,759 \text{ m}^2$$

$$A_{BL} = 0.0 \text{ m}^2$$

Therefore, PD is calculated as:

$$PD = 40,161,000 - 0 / 160,759 - 0$$

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

So,

$$PE_y = 0.$$

5.3 Leakage Emissions

No leakage is to be accounted by the Project Activity. This is in line with the registered PD and applicable methodology ACM0002 – Version 13.0.

Therefore, the leakage from the Project Activity is zero,

$$LE_y = 0.$$

5.4 GHG Emission Reductions and Carbon Dioxide Removals

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)

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

According to ACM0002, emission reductions are calculated as:

$$ER_y = BE_y - PE_y - LE_y$$

where:

ER_y = Emission reductions in year y (t CO₂/yr)

BE_y = Baseline emissions in year y (t CO₂/yr)

PE_y = Project emission in year y (t CO₂/yr)

LE_y = Leakage emissions in year y (t CO₂/yr)

$$BE_y = 62,140.02 \text{ MWh} * 0.5332 \text{ tCO}_2/\text{MWh} = 33,132 \text{ tCO}_2$$

Emission Reductions

$$ER_y = BE_y - PE_y - LE_y$$

$$ER_y = 33,132 - 0 - 0$$

$$ER_y = 33,132 \text{ tCO}_2$$

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCUs (tCO ₂ e)	Removal VCUs (tCO ₂ e)	Total VCUs (tCO ₂ e)
01-Nov-2021 to 31-Dec-2021	1,196	0	0	1,196	0	1,196
01-Jan-2022 to 23-May-2022	31,936	0	0	31,936	0	31,936
Total	33,132	0	0	33,132	0	33,132

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
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01-Nov-2021 to 31-Dec-2021	19,178	1,196	-93.8%	The differences in production occurred depending on the precipitation regime.
01-Jan-2022 to 23-May-2022	44,958	31,936	-29.0%	
Total	64,136	33,132	-48.3%	

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

Section	Information	Justification

