



**Verified Carbon
Standard**

MURAT HEPP PROJECT



EKOBIL Environmental Services and Consultancy Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Murat HEPP Energy Electricity Generation and Trade Inc. (hereafter referred to as the “project owner”) installed a large-scale run-of-river hydroelectric power plant (HEPP) with an installed capacity of 35.478 MWe/36.789 MWm on the Göksu River flowing through Besni, Adıyaman in Turkey’s South-Eastern Region. There are 6 units in the project. The capacity of the first 3 units is 8.410 MWe/8.686 MWm each, and the capacity of the other 3 is 3.416 MWe/3.577 MWm each. The purpose of the project activity is to generate electricity and supply it into the Turkish national grid. The project activity reduces greenhouse gas (GHGs) emissions that would have otherwise occurred in the absence of the project activity by avoiding electricity generation from fossil fuel sources. Murat HEPP has been validated as a Voluntary Emission Reduction (VER) project. Due to its significant contribution in diminishing carbon emissions and protecting the climate as well as due to significant additionality issues discussed in the PDD, this project fulfilled the VCS standard and qualifies for carbon finance. In addition, the project highly supports the sustainable economic development in the region. Below is a list of project milestones, including permits, licences, and contracts:

- General Directorate of State Hydraulic Works: Water use right agreement, 17/10/2008
- Governorship of Adıyaman Provincial Directorate of Environment and Forestry: Confirmation of non-requirement of EIA, 22/04/2009
- Fujian Nandian Co. LTD. and Hangzhou Yatai Hydro Equipment Completing Co. Ltd.; Turbine purchase contract, November 2009
- Yolsu Engineering Services; Revised Feasibility Study Report, June 2009
- Energy Market Regulatory Authority: Construction Licence for Murat HEPP Project, 29/01/2009
- Loan Agreement with Ayrupa Yatirim Bankasi for the project activity, document dated 13/11/2009
- Newspaper Besni Ekspres: Stakeholder meeting invitation, 14/05/2010 and 25/05/2010
- Turkey National Social Security Institution: Confirmation on start date of construction, 10/06/2010
- TEIAS; Interconnection Agreement 21/10/2010
- The starting date of the project activity/start date of the crediting period, 05/10/2012

Audit Type	Period	Program	VVB Name	Number of years
Validation	23-April-2014	VCS	RINA Services S.p.A	10 years
Verification	05-October-2012 – 30-September-2014	VCS	Re-Consult Rüzgar Enerjisi Danışmanlık İç ve Dış Tic. Ltd. Şti.	2 years
Verification	01-October-2014 – 30-September-2020	VCS	4K Earth Science Private Limited (4KES)	6 years
Verification	01-October-2020 – 30-July-2022	VCS	EPIC Sustainability Services Private Limited.	1 year, 10 months
Total verification period (completed)				9 years, 10 months ¹

In the baseline scenario of the project, Murat HEPP has an effect on the power generation of existing power plants attached to the grid; as the electricity generation from these existing generators is reduced. Since Turkey's grid mainly consists of thermal power plants, the implementation of Murat HEPP has resulted in GHG emissions. In the 1st monitoring period (05-October-2012 to 30-September-2014) the total emission reductions achieved was 154,879.00 tonnes of CO₂e. During the 2nd monitoring (01-October-2014 to 30-September-2020) the project produced a net total of 772,402.915 MWh of electricity generation and a total amount of 502,058.00 tCO₂e of emission reduction. For this 3rd monitoring period (01-October-2020 to 30-July-2022) the project has produced a net total of **207,961.511 MWh** electricity and a total amount of **135,173.00 tCO₂e** of emission reduction.

In the project scenario, the project generated electricity from hydropower, resulting in emission reductions in parallel with its electricity generation figures. Implementation of the project included construction of the following main items: Diversion Weir, Conveyance Canal, Fore Bay, Penstock, Turbines.

¹ The months of August and September, 2022 are not included in this monitoring period as per the request of the project owner. This is because a design change that has occurred in August 2022. As the project proponent would like to maintain a conservative outlook, the design change will not be reflected in this monitoring period and instead be presented to VCS for the next crediting period. Omitting the design change from this monitoring period does not affect additionality calculations, and the decision is made on considerations for practicality.

Water from the river has been diverted by a diversion weir (516 m thalweg elevation), and then carried by a 15,002 m-conveyance canal to a fore bay. Accumulated water in the fore bay released through 135 m penstock to the turbines at Murat I HEPP. Murat I HPP's tail-water carried to a fore bay through 5,709 m long conveyance canal. Then accumulated water in the fore bay released through 125 m penstock to the turbines and therefore electricity generated at Murat II HPP. Finally, water is released into the riverbed.

Table 1: Technical Specifications for the Diversion Weir

Type	Non-lidded, Solid webbed	Water Intake Design Flow Rate	50,00 m ³ /sec
Thalweg Elevation	516.00 m	Div. Weir Crest Elev.	520,00 m
Foundation Elev.	505.40 m	Max. Water Elev.	523,00 m
Height from Thalweg	4.00 m	Body Length	100,00 m
Height from Foundation	14.60 m	Gravel Pass No.	2
Water Intake Base Elevation	516.30 m	Fish Passage No.	1

Table 2: Technical Specifications for MURAT I

Main Technical Data		Value		
Turbines	Quantity	3		
	Serial No.'s	ND2010029-01	ND2010029-02	ND2010029-03
	Make/Country of Make/ Year	Fujian Mandian Co. Ltd / P.R. China / 2010		
	Rated Capacity	8.686 MWm		
	Flow rate	16.67 m ³ /s (Total: 50.00 m ³ /s)		
	Rated water head	57.00 m		
	Type	Horizontal axis Francis		
Generators	Quantity	3		
	Serial No.'s	ND2010029-01	ND2010029-02	ND2010029-03
	Make/Country of Make / Year	Fujian Mandian Co. Ltd / P.R. China / 2010		

	Rated Capacity	8.410 MWe
	Rated voltage	10,500 V
	Rated current	50 Hz
	Type	Horizontal axis synchronized generator
Penstock	Radius	3,30 m
	Length	135,00 m
	Wall Thickness	13,0 mm
Forebay	Elevation	513,50 m
	Volume	7500,00 m ³
	Length	55,00 m
	Width	15,70 m
Conveyance Canal	Length	15002,00 m
	Slope	0,0004 j

Table 3: Technical Specifications for MURAT II

Main Technical Data		Value		
Turbines	Quantity	3		
	Serial No.'s	ND2010029-01	ND2010029-02	ND2010029-03
	Make/Country of Make/Year	Fujian Mandian Co. Ltd / P.R. China / 2010		
	Rated Capacity	3.577 MWm		
	Flow rate	16.67 m ³ /s (Total: 50.00 m ³ /s)		
	Rated water head	23.40 m		
	Type	Horizontal axis Francis		
	Quantity	3		

Generators	Serial No.'s	ND2010029-01	ND2010029-02	ND2010029-03
	Make/Country of Make/Year	Fujian Mandian Co. Ltd / P.R. China / 2010		
	Rated Capacity	3.416 MWe		
	Rated voltage	10,500 V		
	Rated current	50 Hz		
	Type	Horizontal axis synchronized generator		
Penstock	Radius	3,30 m		
	Length	125,00 m		
	Wall Thickness	8,0 mm		
Forebay	Elevation	452,38 m		
	Volume	7500,00 m ³		
	Length	55,00 m		
	Width	15,70 m		
Conveyance Canal	Length	5709,00 m		
	Slope	0,0004 j		

1.2 Sectoral Scope and Project Type

The project category is Sectoral Scope 1: Energy industries (renewable-/non-renewable sources). The project type is grid connected electricity generation from renewable sources. The project is a non- grouped, stand-alone project.

1.3 Project Proponent

Organization name	Murat HEPP Energy Electricity Generation and Trade Inc.
Contact person	Suleyman Sait Yalvaç
Title	General Coordinator
Address	Cinnah Caddesi No: 55/10 Çankaya / ANKARA

Telephone	+90 312 441 32 62 / +90 312 441 33 42
Email	syalvac@mehmetgunes.com.tr

1.4 Other Entities Involved in the Project

Organization name	Ekobil Environmental Services and Consulting Ltd ²
Role in the Project	Preparation of the monitoring report
Contact person	Dr. G. Aslı Sezer Özçelik
Title	Co-President
Address	Ahlatlıbel Mahallesi 1839. Sokak no.56 Çankaya 06805 Ankara/Turkey
Telephone	+903124891338
Email	asli.ozcelik@ekobil.com

1.5 Project Start Date

The project start date is 05-October-2012, the date of the six turbines in the plant commenced electricity generation.

1.6 Project Crediting Period

The carbon crediting period and therefore the monitoring started when the plant commenced electricity generation through the turbines in order to supply electricity to the grid on 05-October-2012. The first crediting period is a maximum of ten years which may be renewed once; making a total crediting life of twenty years³. The start date of the first crediting period is 05-October-2012 ending on 04-Oct-2022 (both days included). The second crediting period will be from 05-Oct-2022 to 04-October-2032.

²Registered to the Ankara Chamber of Trade, with the full name of “Ekobil Çevre Hizmetleri Danışmanlık Eğt.Tar. Hayv. Mad. İnş. İth. İhr.Tur. ve Tic. Ltd. Şti.”

³ The validated PD of the project dated 2013 has been prepared with reference to VCS Standard v3.0. This version, in para. 3.8.1 states that “... the project crediting period shall be a maximum of 10 years which may be renewable at most twice”. Thus this information is taken as the basis for the crediting period.

1.7 Project Location

The Project site is located in Turkey's South-Eastern Region, in Adiyaman province, in Besni town and on the Göksu River. The closest village is called Sambayat and is approximately 3 km away from the diversion weir, 9 km from Murat I HEPP and 14 km away from Murat II HEPP.

Precise coordinates for the project activity are:

- Diversion weir: 37° 42' 44.25"N, 38° 2' 58.56"E

Power House:

- Murat I HEPP: 37° 36' 51.99"N, 38° 5' 36.76"E
- Murat II HEPP: 37° 34' 18.92"N, 38° 6' 43.81"E

The following figures show the projects location:

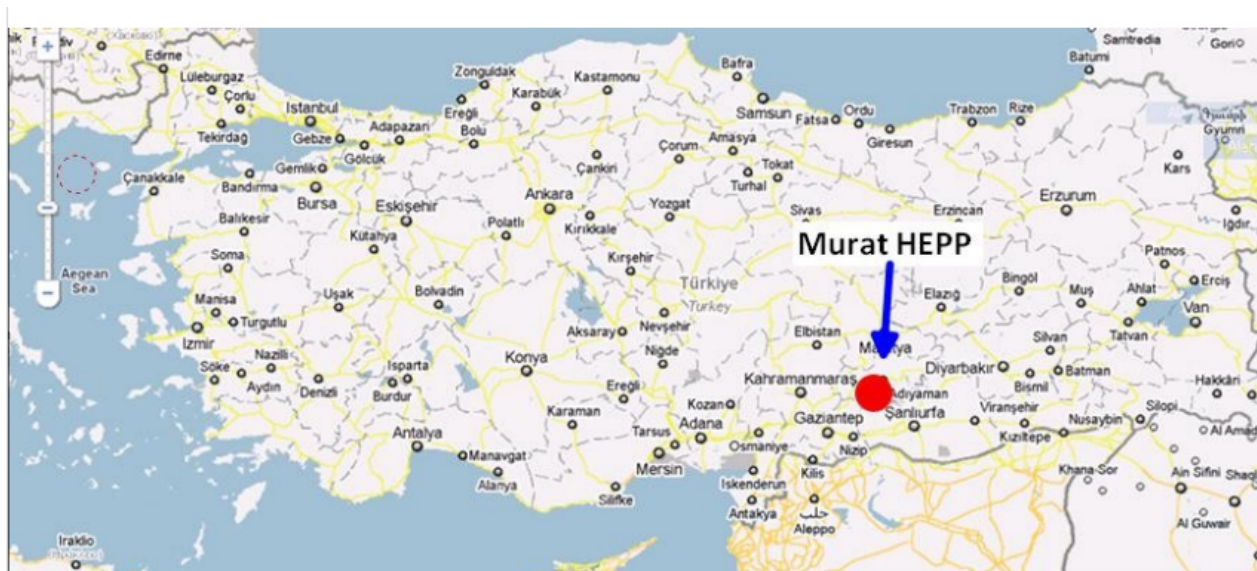


Figure 1: Turkey's map with the project's location

Figure 2 :Project's Location



1.8 Title and Reference of Methodology

The CDM approved baseline and monitoring methodology ACM0002-Version13.0.0: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” is applied.

The Approved Methodology refers to the following tools:

TOOL 07: “Tool to calculate emission factor for an electricity system” (Version 3.0.0)

TOOL 01: “Tool for the demonstration and assessment of additionality” (Version 7.0.0)

Conservative options and data were selected during the implementation of the tools and methodology.

1.9 Participation under other GHG Programs

The project has not participated in any other GHG Programs.

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

Emission Trading Programs and Other Binding Limits: There is no other form of environmental credit generated by the project because there is no such system within the host country.

Other Forms of Environmental Credit: There is no other form of environmental credit generated by the project because there is no such system within the host country.

Supply Chain (Scope 3) Emissions: The project activity is Scope 1 Energy Industries, and it involves energy generation from renewable sources. Therefore, the project does not affect emissions associated with a good or service. Thus Scope 3 emissions are not applicable for the project.

1.11 Sustainable Development Contributions

The project generates electricity by using hydroelectric power to supply the increasing national electricity demand in a cleaner and sustainable manner. It reduces the air pollution caused by the grid connected power plants which are mostly fossil fuel fired.

Murat HPP consists of 6 units; total installed capacity of the project is 35.478 MWe/36.789 MWm. The capacity of 3 units is 8.410 Mwe /8.686 MWm each, and the capacity of the other 3 is 3.416 Mwe/3.577 MWm each. During this monitoring (01-October-2020 to 30-July-2022) the project has produced a net total of 207,961.511 MWh electricity and total amount of 135,173.00 tCO₂e of emission reduction. The project employs 19 individuals from the local area and provides economic stability in the region.

The following is a list of the project's contribution to the UN SDG:

SDG-7 on access to affordable, reliable, and sustainable energy, as the project is not relying on imported fossil fuels.

SDG-8 is to promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all. In this project, occupational trainings and occupational health trainings were given regularly. The project providing decent and secure work environment.

SDG-13 on urgent action to combat climate change, as the project is replacing the fossil fuel based national grid and it is producing emission reductions.

Hydropower presents significant environmental benefits:

- Generating electricity from hydropower energy does not result in emissions of pollutants into the atmosphere with zero residuals that carry adverse impacts on soil, water etc.
- Regular emissions from conventional electricity generation such as sulphur dioxide, nitrogen oxide and particulates will not occur in this case.
- As a renewable energy source hydropower can be used without jeopardizing the supply of primary energy sources in the future
- The proposed project will significantly contribute to the reduction of GHGs.

Hydropower presents significant economic benefits:

Emission of pollutants such as sulphur dioxide through shifting to fossil fuel-based electricity generation in the region to satisfy the needs of fast-growing industry will result in damaging the quality of agriculture and cause economic harm in the region.

The project pursues significant social benefits to the communities in the project area, such as:

- The operation of the plant resulted in extra employment in the local area. The project created employment in the region.

Table 4: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	Renewable energy share in the total final energy consumption	Implemented activities to increase	For this 3rd monitoring (01-October-2020 to 30-July-2022) the project has produced a net total of 207,961.511 MWh electricity from hydropower.	Generating electricity from hydropower energy does not result in emissions of pollutants into the atmosphere with zero residuals that carry adverse impacts on soil and water. The project has generated 1,218,642.3 MWh of electricity since it began operation on 05-October-2012.
2)	8.5	Unemployment rate, by sex, age, and persons with disabilities	Implemented activities decrease to	Employment opportunities for local people and equal pay for work of equal value. Currently, there are 19 personnel working at the project site, most of them coming from the local villages.	The local workers are given priority during the hiring for plant operation. The project has provided employment to 114 individuals, during its construction phase. The project has consistently employed around 20 people in its operation phase since October 2012, and has provided long-term employment.
3)	13.2	Total greenhouse gas emissions per year	Implemented activities decrease to	For this 3rd monitoring (01-October-2020 to 30-July-2022) the project has produce 135,173.00 tCO ₂ e of emission reduction.	Regular emissions from conventional electricity generation such as Sulphur dioxide, nitrogen oxide and particulates does not occur in this case. Thus, the project has produced total amount of 792,112.00 tCO ₂ e of emission reduction since it began operation on 05-October-2012.

2 SAFEGUARDS

2.1 No Net Harm

The project will contribute to reduce the adverse effects of climate change by the construction of two Greenfield hydropower plants. The project activity itself will not have any significant negative impacts on humans, plants, animal life and biodiversity. The Municipal Environment and Forestry Directorate of the Adiyaman Municipality has examined the project presentation document and determined that the project has provided sufficient environmental precautions and hence does not require a further EIA documentation process. This decision is made in line with the 17th clause of the EIA Regulation of the Republic of Turkey⁴. In Section 1, Clause (ğ) of the regulation, EIA Non-requirement is defined as "... the Ministerial decision stating that the project's realization does not create unfavorable environmental circumstances and is made upon determining that the potential negative impact of the project are within acceptable range, as a result of the precautions taken." Section 2 Clause 5 of the Regulation states that the "EIA is not required" decision is at the discretion of the Ministry of Environment, Urbanism and Climate Change, but might be delegated to the Municipal Directorates, as is the case of this project. The EIA non-requirement permit has been granted by the Adiyaman Municipal Directorate of Environment and Forestry. The decision is numbered 29 and dated April 22nd, 2009; and is presented in Appendix 1 of this document.

2.2 Local Stakeholder Consultation

The stakeholder's consultation meeting was conducted on May 28th, 2010, at the Yayla Cafe in Sambayat Town, Besni, Adiyaman Province. This date was chosen, as it was considered to be convenient to all the participants to attend.

An invitation was prepared for the Stakeholder Consultation and sent to the national and local policy makers via e-mail. For the participation of various groups of people to the meeting local head of the villages (Muhtar) and other male locals were asked to attend to the meeting with their spouses.

All invitations sent by email, fax and mail contained a non-technical summary of the project in Turkish (please refer to Annex 3 in the validated PD to find a copy of the non-technical summary). Also these invitations included the contact information of the project consultant Suen Ltd. and all stakeholders invited by the above mentioned means were kindly asked to share their comments about the project.

⁴ <https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=39647&MevzuatTur=7&MevzuatTertip=5>

Apart from the invited local residents by public announcements, the project participant and Suen Engineering and Consultancy Ltd have invited 20 other national and local stakeholders to participate in the meeting and the assessment process. The invited stakeholders were chosen to represent the local policy makers, Non-Governmental Organizations and local people affected by the project.

In addition to the mentioned invitations, two newspaper announcements were made in the regional newspaper Besni Ekspres on May 14th and 25th 2010.

Local stakeholders were interested in the meeting and there were participants even from neighbouring towns. 37 people signed the participants list. (Please refer to Annex 3 in the validated PD to find a copy of the original participants list)

None of the invited local policy makers and Non-Governmental Organizations attended the meeting because of their busy schedules. Local Military commander attended the meeting halfway through. There were three Muhtars representing their fellow neighbours.

Although specifically encouraged, there were no women at the meeting, probably because of cultural dynamics in the region. In Turkey's rural regions, men are the dominant part of the family, and they are the only ones to decide on family or social affairs. Women, on the other hand are responsible for domestic household tasks such as child rising, cooking etc. As this has been the case for years, there has been a clear-cut discrepancy between the role of man and women in different stages of their lives. Therefore, it seems to have been the task of men to attend the meeting.

All guests were registered followed by a welcome speech by Aynur Sezer (Suen Ltd.), who gave information about the project and global warming.

After all the aspects of the project were presented to the participants, they were discussed by the stakeholders and clarifications were requested.

All the participants were asked to fill out an evaluation form, which included the following questions:

- What is your impression about the meeting?
- What do you like about the project?
- What do you not like about the project?

All participants were optimistic about the project's positive impact on the economy of the country and global warming. However, some of the people attended the meeting to ask about expropriation issues since at the time of the meeting, there were still some lands which had not

been expropriated yet. People were therefore curious about the result of this matter. There are currently no expropriation matters pending during the 3rd monitoring period of the project.

One of the main topics at the meeting was related to employment opportunities for the local people. A local participant explained that most of the local people were unemployed and that they needed jobs more than anything else. A representative of the project participant explained that their priority is to employ local people and that they will employ as many as possible. Approximately 300 people had been employed during the construction phase and as of 2022 there are 19 employees for the operation phase.

Furthermore, a team from Project participant and project consultant firm had an unofficial meeting with Besni city Mayor, Mr. Orhan Mutlu who was not able to attend the meeting and an official meeting with the local military commander. As official state representatives in the region, their ideas were important, and their suggestions were taken into consideration.

In addition to these meetings, a team of Suen Ltd. will undertake a second visit to the project area in order to check if there is any concern among people regarding the project. The main purpose is to gather people's ideas and concerns about the project and to clarify any doubts. This tour includes the neighboring towns where there might be locals who were not able to attend the physical meeting. Moreover, when project site is established on the project area, evaluation forms and a notebook will be kept to collect further comments as mentioned during consultation meeting.

During the current monitoring period, stakeholders stated that they have no difficulty in communicating with the plant site and its managers. They can reach the managers by phone when necessary. They stated that they were able to convey any problems to the project authorities. Stakeholders can physically reach the plant area and they can also communicate by phone. The company also engaged in social responsibility activities such as road works and condolence house construction in order to support the people of the region. Project owners use communication by phone and mail as a mechanism for on-going communication mechanism. The proximity of the project site to the Şambayat Village has created a familiarity among the villagers and project owners, thus personal contact is available alongside telephone and e-mail communication. The villagers can obtain the contact information from their village heads who are in closer communication with the project. If any negative comment about the project received project owners plan to take immediate action about the problem. Immediate and simple problems are resolved at the local level, with the facility manager and the mediation of the mukhtar, who acts as a local representative. If solution is not achieved at this stage, the issue will be taken up to the company hierarchy to address the problem and deploy company representatives to the site to talk to the locals and embark in program solving together.. The project owners have not received any negative comments about the project during this monitoring period. The comments are received without the need for formal announcement of meetings, as

the project owners are in direct communication with the mukhtar and the on-going communication is maintained through the mukhtar.

2.3 AFOLU-Specific Safeguards

The project is a non-AFOLU project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Starting date of the project activity is 05 October 2012, date of the six horizontal axis Francis Turbines in the plant commences electricity generation. The carbon crediting period and therefore the monitoring starts when the plant commences electricity generation through the turbines, which started to supply electricity to the grid on 05 Oct 2012. Since then, the power plant operates in full capacity.

Figure 3: Schematic diagram of a channel type **run-of-river** HPP

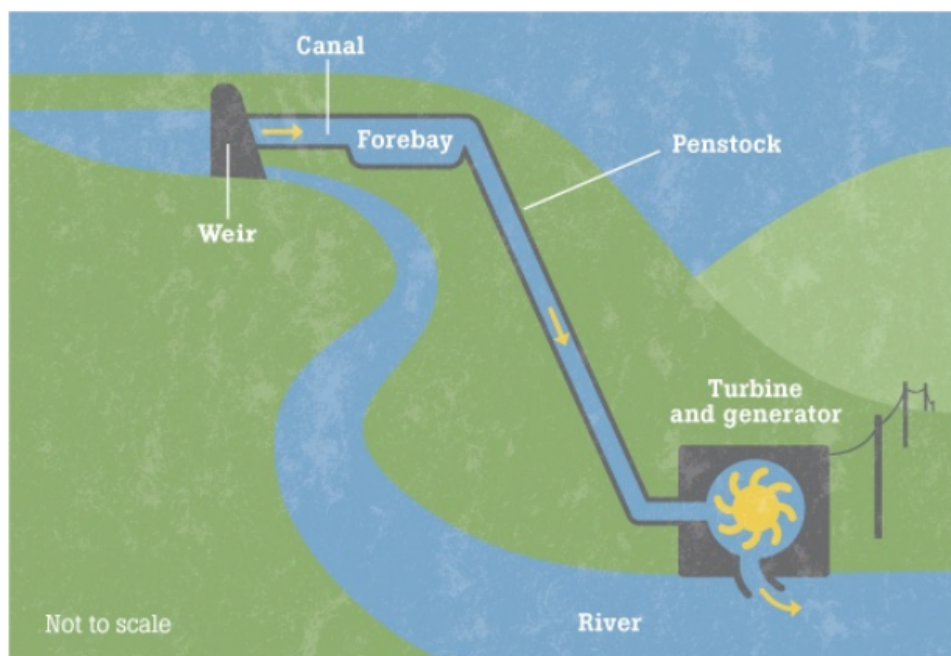


Figure 4 :Murat HPP Project Elevation Diagram

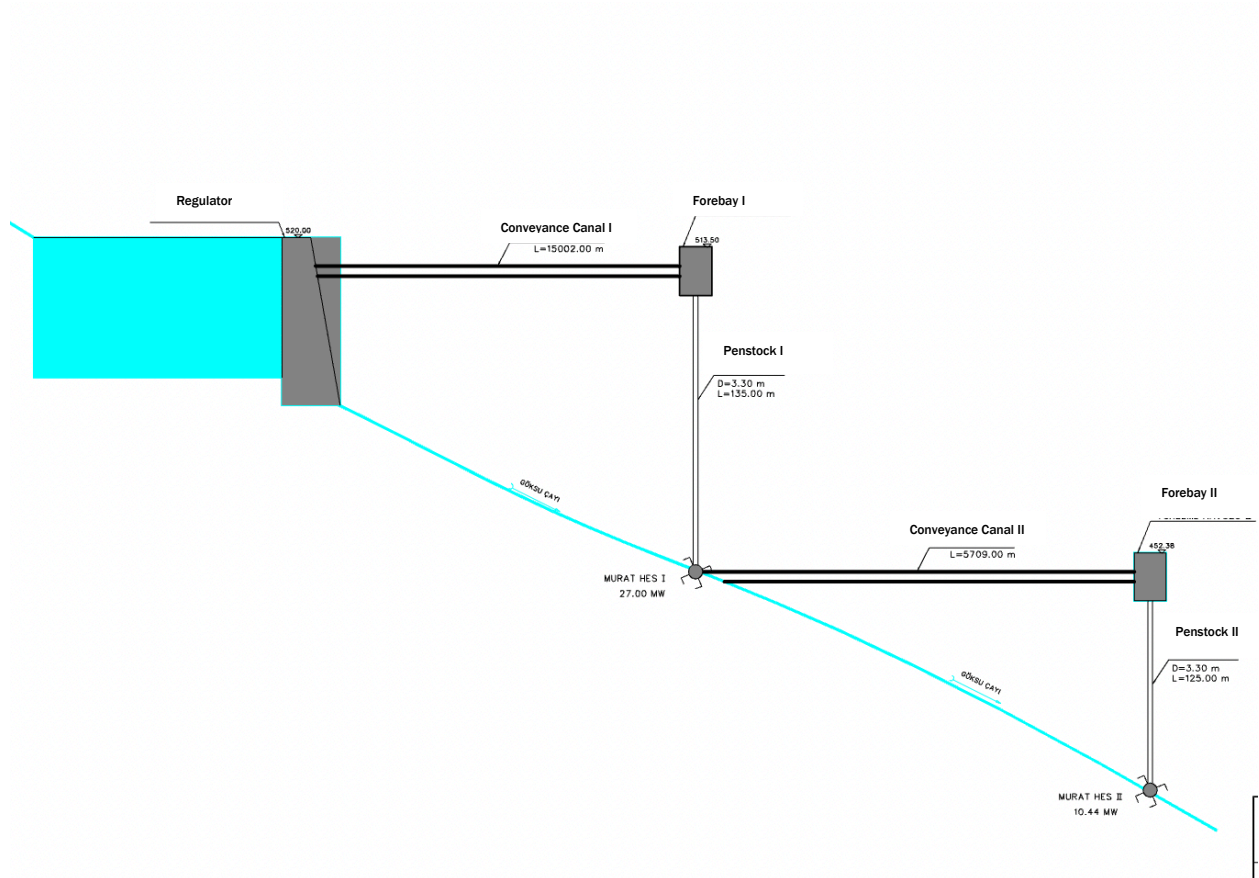


Figure 5 :Murat HPP Project Flow Diagram

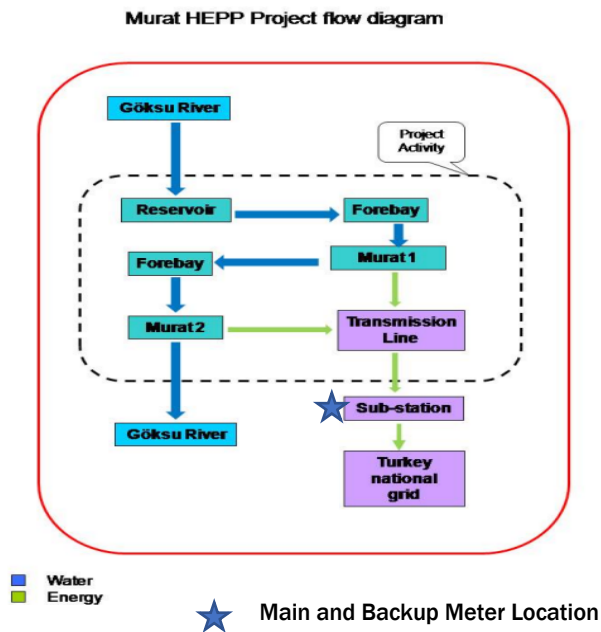
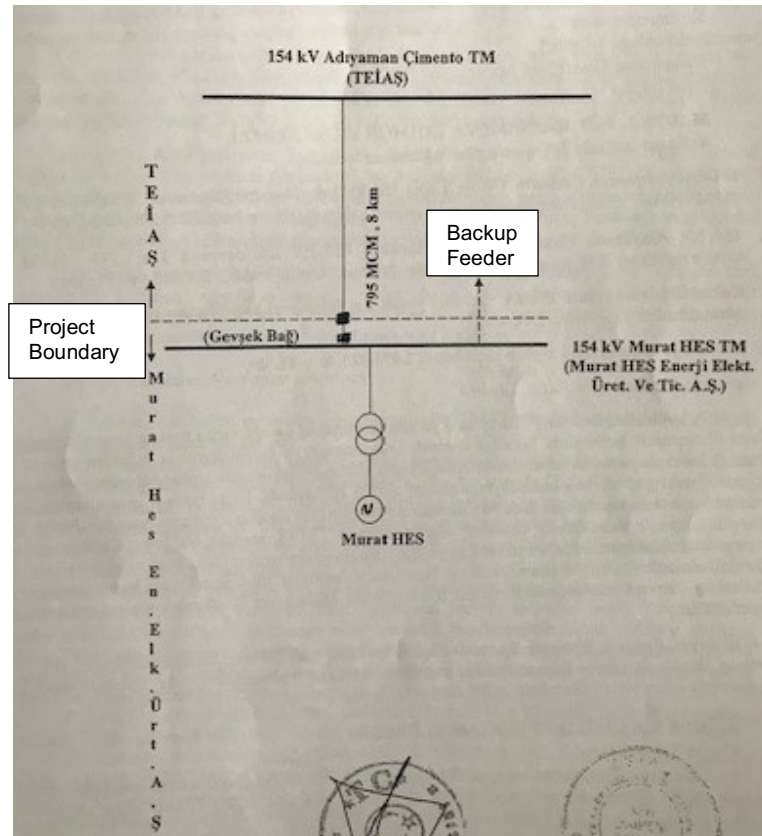


Figure 6: Single-Line Diagram of Murat HPP, appendix to the Connection Agreement with TEİAŞ



The project activity has been connected to the Turkish interconnected electricity grid; therefore, the produced electricity has been transmitted to TEİAŞ as per the agreement signed with Murat HEPP Energy Electricity Generation and Trade Inc. During this monitoring period (01-October-2020 to 30-July-2022), no emergencies or abnormal situations have been experienced upon cross-checking with the maintenance schedule.

The power plant operated normally during this monitoring period. There have been no emergencies happening to the monitoring system in this monitoring period. Based on the registered VCS PD version 04, emission reductions corresponding to this monitoring period (22 months) are expected to be 179,215.00 tCO₂e. As the actual emission reduction is less than the estimated emission reduction, hence no impact on the project activity.

In the project, it is observed that there is an increase in estimated annual emission reduction in some years and a decrease in others. It is known that climate change poses a challenge to water and hydropower plants by introducing uncertainty in hydrological conditions. This project was also affected by the uncertainty created by climate change. The reason for the production that is below or above the expected in the project is that climate change changes the river discharge, affects the water availability, and hence hydroelectricity production. Therefore, the drought periods experienced caused low production, and unexpected excessive precipitation periods caused high

production. The electricity productions of the power plant are in harmony with the annual precipitation graph of the region.

Meters were changed in 26.09.2020 by TEIAS. Detailed information about meters is given in Table 2. There are no material discrepancies between the implementation of the project and the project description except a deviation as mentioned under section 3.2.2 of MR.

3.2 Deviations

3.2.1 Methodology Deviations

The source of the parameter “Quantity of net electricity generation supplied by the Project plant/unit to the grid in year y” was given as “Monthly Meter Reading Protocols” in the VCS PD. However, since TEIAS started to measure the produced electricity remotely, Monthly Meter Reading Protocols are not available. Therefore, the source of the parameter is defined as “Market Financial Settlement Center (PMUM) records which includes the exact electricity productions and tractions. PMUM records are the basis of the invoices made out to TEIAS. Due to the practical difficulty of obtaining these PMUM records, the monthly official TEIAS forms are used.

The source for the cross-check of the amount of produced electricity is also revised as “OSF (Otomasyon Sistemleri Fonksiyonları—Automation Systems Functions) Forms” which are prepared by TEIAS after the remote measurements of the meters and sent to the plant engineer by e-mail at the end of each month.

With the legislation that came into force on 01.12.2011, the remote reading system was introduced by TEIAS. Since the start date of the project, the production data have been monitored with the remote reading system.

This deviation does not negatively impact the conservativeness of the quantification of GHG emission reductions or removals since this deviation is only related to the source of information. This change in the source of the information has no effect on the production data and the deviation is only related to the way the information is received.

There is no deviation that occurred during the current monitoring period. The above-mentioned deviation was covered in the first monitoring period, from 05-October-2012 to 30-September-2014.

3.2.2 Project Description Deviations

The following project deviation is noticed during for the previous monitoring periods;

The installed power of the project is given in the PD as 37.220 Mwe, however the actual realized value of the installed power is 35.478 MWe because of the design requirements of the OEM company. At the time of preparing the final field application projects of Murat HPP due to the geographical conditions of the Project site such as slope and elevation amendment requirements, the Project owner had the need to revise the installed power in the FSR report and

on final application projects. Both (FSR and Project drawings) had been presented to DSI (General Directorate of State Hydraulic Works) and these have been reviewed and approved by DSI. After this approval, the Project owner applied to EMRA for the amendment of the installed power on the license. Their request has been reviewed by EMRA and assessed to be approved for amendment, which is then the license has been amended according to the relevant request.

Since PDD was written and prepared during the project construction phase and the equipment was not installed at that time, such a difference in capacity occurred. The difference between the installed capacity of the project and the anticipated capacity was determined before the first monitoring and was given in detail in the first verification report of the project which covers the period of 05-October-2012 to 30-September-2014. This deviation occurred with the establishment of the equipment of the project. The actual capacity can be directly crosschecked with the plate photos.

The mentioned deviation does not impact the applicability of the methodology as it only changes the installed capacity of the project activity and not the type or scale of the project. The additionality of the project activity is also not affected by this deviation since the project is between the limits checked with the sensitivity analysis. The deviation does not affect the appropriateness of the baseline scenario as it remains the same. The abovementioned deviation pertains to the first monitoring period, from 05-October-2012 to 30-September-2014.

The sole deviation that pertains to the current monitoring period is a typing error detected in the validated PD. The end of the crediting period is denoted wrongfully as 31-September-2022 once in the validated PD, which is a date that does not exist. This MR notes this error in the PD and reiterated that the correct end of the crediting period is 04-Oct-2022.

3.3 Grouped Projects

N/A. Project is not a grouped project activity.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EGy
Data unit	GWh
Description	Net electricity generated and delivered to the grid by all power sources serving the system, excluding low-cost/must-run units/plants, in year y
Source of data	Annual development of installed capacity and generation in Turkey ⁵
Value applied	Indicated in the Table 10 of validated PD
Justification of choice of data or description of measurement methods and procedures applied	According to “Turkish Statistics Law and Official Statistics Program” TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate Information available.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	FCi,y
Data unit	m ³ / tons (m ³ for gaseous fuels)
Description	Amount of fossil fuel consumed in the project electricity system by generation sources in year y
Source of data	TEIAS (Turkish Electricity Transmission Company) Fuels consumed in thermal power plants in Turkey by the electric utilities for year y ⁶
Value applied	Indicated in the Table 11 of validated PD
Justification of choice of data or description of measurement methods and procedures applied	According to “Turkish Statistics Law and Official Statistics Program” TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available.
Purpose of Data	Calculation of baseline emissions

⁵ <https://webim.teias.gov.tr/file/51b3525a-e300-4f97-acf4-4d9cf2d53c69?download>

⁶ <https://webim.teias.gov.tr/file/e0b1817b-71e9-4594-869b-064897081530?download>

Comments	-
Data / Parameter	Electricity Imports
Data unit	MWh
Description	Electricity transfers from connected electricity systems to the project electricity system by years (2006-2010)
Source of data	TEIAS (Turkish Electrical Transmission Company) Annual development of Turkey's gross electricity generation imports exports and demand ⁷
Value applied	Indicated in the Table 13 of validated PD
Justification of choice of data or description of measurement methods and procedures applied	Data used for emission reduction estimation. Net electricity generated and delivered to the grid by all power sources serving the system.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Heat Value
Data unit	TJ
Description	Amount of heat produced by the consumption of a unit quantity of fuel types consumed in thermal power plants.
Source of data	TEIAS (Turkish Electricity Transmission Company) Heating values of fuels consumed in thermal plants in Turkey by the electricity utilities (2010). ⁸
Value applied	Indicated in the in Table 11 of validated PD
Justification of choice of data or description of measurement methods and procedures applied	According to "Turkish Statistics Law and Official Statistics Program" TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up to-date and accurate information available. Heat value is divided by FC to determine NCV.(The formula is taken from 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Purpose of Data	Calculation of baseline emissions
Comments	-

⁷<https://webim.teias.gov.tr/file/6fb14194-adf4-47d4-b9b2-d38b8ff351ed?download>
⁸<https://webim.teias.gov.tr/file/e0b1817b-71e9-4594-869b-064897081530?download>

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Simple operating margin CO ₂ emission factor of the grid in year y
Source of data	Calculated value as per “Tool to calculate the emission factor for an electricity system” (Version 3.0.0)
Value applied	0.657 ((average of 3 years 2008, 2009 and 2010) Annex 3 , Details of OM calculation (pg. 93) of the validated PD
Justification of choice of data or description of measurement methods and procedures applied	The calculations follow the “Tool to calculate the emission factor for an electricity system” (Version 3.0.0.) Fixed on the basis of 3-year generation-weighted average based on the most recent data available at the time of PDD submission (2008-2010)
Purpose of Data	Calculation of baseline emissions
Comments	Value is calculated ex-ante and is fixed during the crediting period.

Data / Parameter	NCV _{i,y}
Data unit	GJ/tonnes
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	TEIAS (Turkish Electricity Transmission Company) Heating values of fuels consumed in thermal plants in Turkey by the electricity utilities ⁹
Value applied	Indicated in the page 94 of validated PD
Justification of choice of data or description of measurement methods and procedures applied	According to “Turkish Statistics Law and Official Statistics Program” TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up to-date and accurate information available.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	EF _{CO₂,i,y}
Data unit	tCO ₂ /GJ
Description	CO ₂ emission factor of fossil fuel type i in year y

⁹ <https://webim.teias.gov.tr/file/46d3ce93-0127-4536-ac81-27e66e736af6?download>

Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 and Annex 1 for sub bituminous of Chapter 1 of Volume 2 (Energy) of the 2006 IPCC Guidelines for National Greenhouse Gas Inventory.
Value applied	Indicated in the Table 12 of the validated PD
Justification of choice of data or description of measurement methods and procedures applied	There is no information on the fuel specific default emission factor in Turkey, hence, IPCC values has been used as referred in the “Tool to calculate the emission factor for an electricity system, version 3.0.0”.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build operating margin CO ₂ emission factor of the grid in year y
Source of data	Calculated value as per “Tool to calculate the emission factor for an electricity system” (Version 3.0.0)
Value applied	0.643
Justification of choice of data or description of measurement methods and procedures applied	Calculated ex-ante and comprised capacity addition of power plants between years 2006-2010 according to the “Tool to calculate emission factor for an electricity system, version 3.0.0.”
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	<i>Capacity additions</i>
Data unit	Name of the plant; Installed capacity (MW); Fuel type; generation (GWh);
Description	Capacity additions to the grid that comprises 20% of the total generation (2006-2010)
Source of data	Generation units put into operation in 2006;2007;2008;2009;2010 http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf
Value applied	Annex 3 Baseline Information in the validated PD.

Justification of choice of data or description of measurement methods and procedures applied	According to „Turkish Statistics Law and Official Statistics Program“ TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up to-date and accurate information available. Since the summation of capacity additions between 2006 and 2010 are not sufficiently large, the capacity generation of 21 plants with latest starting date to operation at 2006 should be added to meet the %20 of total generation at 2010.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	EF _{grid, CM, y}
Data unit	tCO ₂ /MWh
Description	Combined margin CO2 emission factor in year y
Source of data	Calculated data applied to the equation 5 in the validated PD.
Value applied	0.65
Justification of choice of data or description of measurement methods and procedures applied	Calculated ex-ante according to the “Tool to calculate emission factor for an electricity system, Version 3.0.0.”, EB 70 Annex 22.”
Purpose of Data	Calculation of baseline emissions
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ,y}
Data unit	MWh/yr
Description	Quantity of net electricity delivered to the grid in year y
Source of data	OSF “Otomasyon Sistemleri Fonksiyonları” (Automation Systems Functions) records
Description of measurement methods and procedures to be applied	Two sets of meters have been used continuously for measurement. Then the net electricity generation supplied by the project to grid has been calculated.

Frequency of monitoring/recording	Continuous monitoring and monthly recording																									
Value monitored	207,961.511MWh																									
Monitoring equipment	Relevant information regarding the main meter and the control meter have been provided as follows: • Main Electricity meter • Back-up Electricity meter <table border="1"> <thead> <tr> <th>Meters</th><th>Main Meter</th><th>Back-up (Control) Meter</th></tr> </thead> <tbody> <tr> <td>Calibration Date</td><td>26/09/2020</td><td>26/09/2020</td></tr> <tr> <td>Reason for Change</td><td colspan="2">End of the 10-year meter calibration period</td></tr> <tr> <td>Brand</td><td>EMH</td><td>EMH</td></tr> <tr> <td>Type</td><td>LZQJ-XC</td><td>LZQJ-XC</td></tr> <tr> <td>Serial Number</td><td>9798700</td><td>9798701</td></tr> <tr> <td>Accuracy class</td><td>0.2S</td><td>0.2S</td></tr> <tr> <td>Country of Make</td><td>Germany</td><td>Germany</td></tr> </tbody> </table> All the measurements and calculations are done via tested meters. The calibrations of the electricity meters are the responsibility of TEIAS and the project owner has no control over this calibration process. TEIAS personnel sealed the meters. The necessary maintenance and calibration are the responsibility of TEIAS.		Meters	Main Meter	Back-up (Control) Meter	Calibration Date	26/09/2020	26/09/2020	Reason for Change	End of the 10-year meter calibration period		Brand	EMH	EMH	Type	LZQJ-XC	LZQJ-XC	Serial Number	9798700	9798701	Accuracy class	0.2S	0.2S	Country of Make	Germany	Germany
Meters	Main Meter	Back-up (Control) Meter																								
Calibration Date	26/09/2020	26/09/2020																								
Reason for Change	End of the 10-year meter calibration period																									
Brand	EMH	EMH																								
Type	LZQJ-XC	LZQJ-XC																								
Serial Number	9798700	9798701																								
Accuracy class	0.2S	0.2S																								
Country of Make	Germany	Germany																								
QA/QC procedures to be applied	Murat HEPP Energy is responsible for providing the OSF records which shows the monthly electricity generation of the company. In addition to the metering system, generation of Murat HEPP can be crosschecked from on-site measurement records. These records provide the total electricity generation, transmission loss, and the net electricity generation. Manual Meter Reading Forms are the on-site records for cross check and are provided to DOE.																									

Purpose of the data	Calculation of baseline emissions
Calculation method	$EG_{PJ,y} = EG_{export,y} - EG_{import,y}$
Comments	-

Data / Parameter	Cap _{PJ}
Data unit	W
Description	Installed Capacity of the hydropower plant after the implementation of the project activity
Source of data	Project site
Description of measurement methods and procedures to be applied	Supplier information on the equipment
Frequency of monitoring/recording	Annually
Value monitored	35,478,000 W
Monitoring equipment	Name plates of the generators.
QA/QC procedures to be applied	Supplier information on the equipment and existence of the equipment will be checked.
Purpose of the data	Calculation of power density and project emissions
Calculation method	NA
Comments	-

Data / Parameter	A _{PJ}
Data unit	m ²
Description	Surface of the regulation pond after the implementation of the project activity, when the reservoir is full
Source of data	Project site
Description of measurement methods and procedures to be applied	The area was calculated by making coordinate readings around the border of the reservoir through topographical surveys or GPS readings. The technical drawing of the regulator area is based on

	topographical surveys. Based on the technical drawing, the reservoir area is calculated by a computer program.
Frequency of monitoring/recording	Annually
Value monitored	640,471.91 m ² (The company record on the measurement of the reservoir area can be found in Appendix I of the validated PD)
Monitoring equipment	N/A
QA/QC procedures to be applied	The technical drawing of the regulator area obtained from final design of the project is computerized and the potential lake area for the flood discharge (possible maximum water level) is calculated. (The company record on the measurement of the reservoir area can be found in Appendix I of the validated PD)
Purpose of the data	Calculation of power density and project emissions
Calculation method	N/A
Comments	-

4.3 Monitoring Plan

All relevant baseline emission factors are defined ex-ante. Hence, there are three sets of data to be monitored during the project activity.

The first one is the amount of electricity fed into the grid. There is already an electricity meter installation plan to provide the data that is required by the monthly invoicing process to TEIAS. Murat HEPP is a new electricity generation unit which did not replace a fossil fuel plant on the project site.

Murat HEPP Energy is responsible for providing the PMUM records which shows the monthly electricity generation of the company. In addition to the metering system, generation of Murat HEPP can be crosschecked from on-site measurement records. The PMUM records can provide both the net electricity generation less transmission loss and electricity generation deducted transmission loss.

Table 5: Information About Meters

Meter	Serial Number	Calibration Done On	Valid Until ¹⁰	Type
Main Meter (Old)	424740	2012	2022	Elster A1500

¹⁰Within the scope of the regulation in Turkey (<https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6381&MevzuatTur=7&MevzuatTertip=5>), the stamp year is taken as basis year and the year it is stamped is counted as the first year, regardless of the date and the remaining period is calculated from the year it was stamped.

Spare Meter (Old)	424741	2012	2022	Elster A1500
Main Meter (New)	9798700	2020	2030	EMH LZQJ-XC
Spare Meter (New)	9798701	2020	2030	EMH LZQJ-XC

Both meters were changed on 26.09.2020. These meters are valid for 10 years by Turkish regulations. All meters are in compliance with the host country calibration regulations¹¹. They have an accuracy class of Class 002 indicating an accuracy range of 0.2%. Calibrations of these new meters were made by Turkish Standards Institute and later they are sealed by the TEIAS. In order to check the data of imported and exported electricity from the PMUM web page the following steps had been completed.

The purpose of the monitoring plan is to ensure that the monitoring and calculation of emission reductions of the proposed Project within the crediting period is complete, consistent, clear and accurate. The project is operated by Murat HEPP Energy which ensures the overall site management in accordance with Turkish Laws and technology providers' guidelines. The major quality assurance of the monitoring relies on the reporting system that has been regularly checked by the Board of Murat HEPP Energy Electricity Generation and Trade Inc.

VER monitoring team members:

General Manager: Responsible for the general aspects of the plant and VER monitoring plan. General Manager is responsible for the control of the electricity supplied to the grid and imported from the grid with TEIAS. The electricity measurements are made by TEIAS remotely and the plant engineer is informed by TEIAS by e-mail regarding the electricity measurements by an e-mail each month. (An excel sheet called "OSF Form – Dengeleme Birimi Sayaç Değerleri Formu" (balancing unit energy meter readings table) which includes the hourly electricity supply and consumption values of the project is sent to the plant engineer from TEIAS.) The plant engineer checks these electricity readings records and reports to the Operations Manager of the plant. He is also the VER coordinator. They are in charge of:

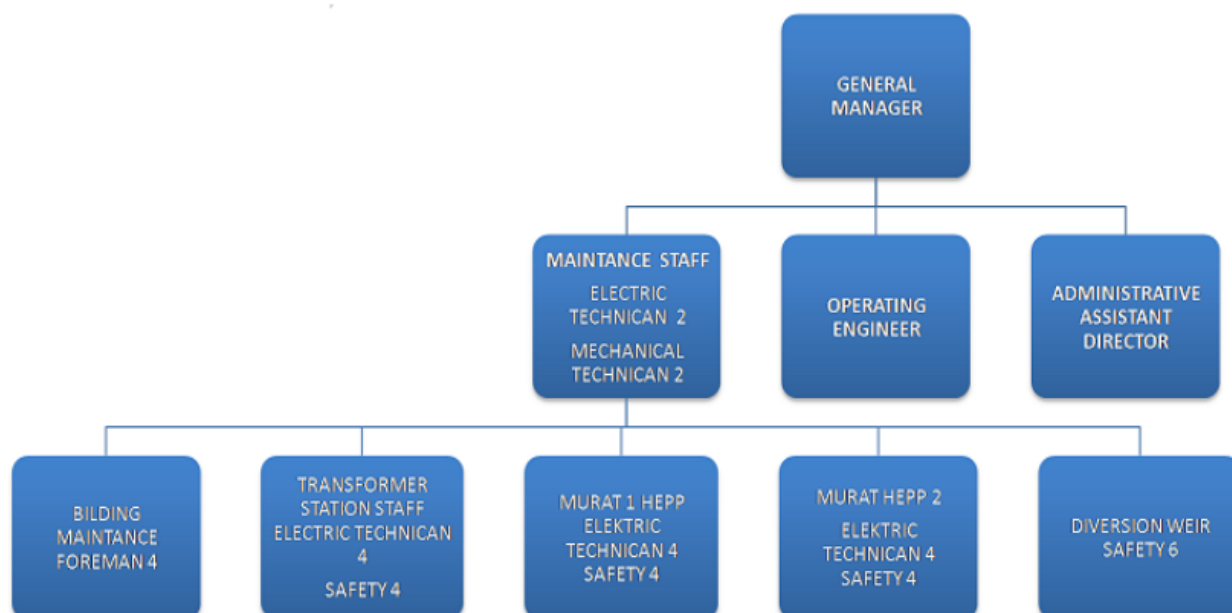
- Ensuring that instrumentations and devices are available and properly suited to perform efficiently the monitoring.
- Communicating and coordinating the monitoring tasks of all business units.
- Developing, executing, analyzing and improving the VER Monitoring/Reporting Procedures. This includes the crosschecking and consolidation (with multiple sources whenever possible) of the data obtained from the electrical engineers and the accounting manager. He also recorded this operation properly to be able to provide it to the DOE during the verification process.
- Calculating and report the emission reductions,

Operating Engineer: Responsible for the electrical matters and from the recording and monitoring of relevant data. Ensure that all the instrumentations and devices are working properly. Operating Engineers

¹¹<https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6381&MevzuatTur=7&MevzuatTertip=5>

ensure that all the instrumentations and devices to perform the monitoring are working properly. Responsible for keeping data which are used on electricity sales, invoicing and purchasing.

Figure 7: Organization Structure



Carbon consultant: Responsible for emission reduction calculations, preparing the monitoring report and managing the monitoring report verification process.

In order to verify the generated units of emission reductions, the Carbon consultant, has prepared an annual Report of Vigilance of the Project, in which the following important aspects include:

. Year

- Net electricity supplied by the project activity to the grid (in MWh)
- Annual gross electricity generation (in MWh)
- Annual electricity consumption (in MWh)
- Calculation of the emissions reductions: ERs per year (in tCO₂e/yr) produced from the activity of the project

Each monitoring report will be submitted to DOE for the verification. The report covers the monitoring of grid-connected power generation, check report; report on calculation of the emission reductions and records of monitoring instrument repair and calibration, etc. Data will be recorded for each crediting period and maintained at least 2 years after its end. The company will establish a dedicated maintenance system to ensure the data availability for the required period.

In the powerhouse, there are two electricity meters in order to measure the produced electricity accurately. One is the main meter for measuring and the other is the check meter for control. Both of

these meters are metering the energy in two directions (import and export) and are connected on-line to TEIAS via GSM line. If there is a measuring difference between these two meters and one of the parties (TEIAS or the company) requests for calibration of the meters, in this case, the meters will be calibrated without waiting for the periodic calibration date. (TEIAS System Usage Agreement, Art 3, B./2./b))¹² This calibration process is done by another third party under the control of TEIAS. The company is not responsible for calibration of the meters in Turkey according to the local standards.

The meters are first hand and the supplier company commits that these meters fully conforms or exceeds all relevant IEC standards including those dealing with electronic metering equipment for class 002 equipment. In addition, the company had the meters tested by a third party (Kesir Müh. Elekt) on 21 December 2011 to verify if the meters measure the electricity production accurately. The results show that the meters measure the electricity with a 0.268% error which is in line with the expected range. There is no possibility for human error in the measurement of the electricity. All the measurements and calculations are done via tested meters. If there is a measuring difference between these two meters and one of the parties (TEIAS or the company) requests for calibration of the meters, in this case, the meters will be calibrated without waiting for the periodic calibration date. (TEIAS System Usage Agreement, Art 3, B./2./b)¹³ This calibration process is done by another third party under the control of TEIAS. The company is not responsible for calibration of the meters in Turkey according to the local standards. The monitoring of the power generation and recordings are done under the supervision of the plant manager. Every month, the measurement of electricity is made by TEIAS remotely and the plant engineer is informed by TEIAS by e-mail regarding the electricity measurements by an e-mail each month. (An excel sheet called “OSF Form – Dengeleme Birimi Sayaç Değerleri Formu” which includes the hourly electricity generations and imports is sent to the plant engineer from TEIAS. If there is a network problem and it is not possible to measure the electricity remotely, a representative from TEIAS visits the project site and measures the electricity by connecting to the meters directly. However, since there was not a network problem during the Monitoring period, all measurements were made remotely). In addition, all production figures which are subject to sales to the grid and are agreed with PMUM (Market Financial Reconciliation Centre), can be accessed from PMUM’s web site by the seller.

Therefore, net electricity production figures¹⁴ announced by PMUM will be used in emission calculation figures. An excel file with the monthly and annual generation is attached to this monitoring report. The power generated and supplied is monitored continuously and is recorded on a daily basis and aggregated into monthly totals.

The second data to be monitored is the installed capacity of the project activity. The installed capacity only changes if the project design is changed. If there is any change in the installed capacity of the project, EMRA has to be informed about this change. The company will report the installed capacity changes in each monitoring period, if there is any and this information will be checked from EMRA website and the current license of the project. The plant manager will be responsible to provide the data. The installed capacity of the project is 35.478 MWe. The third data to be monitored is the reservoir area. This data is calculated from coordinate readings. The data are collected by the project owner during the period when the water flow is high. However, since determining the maximum water level is difficult, to be on the

¹²<https://www.epdk.gov.tr/Detay/DownloadDocument?id=17ayTgQDJk8=>

¹³ <https://www.epdk.gov.tr/Detay/DownloadDocument?id=17ayTgQDJk8=>

¹⁴Net electricity production figure = Electricity generation (operation base) – Electricity traction from grid

conservative side, this parameter is measured from technical drawings of the project. The technical drawing of the regulator area obtained from the final design of the project is computerized and the potential lake area for the flood discharge (possible maximum water level) is projected. The reservoir area has been calculated as 640.471,91 m² when the reservoir is at the fullest capacity. The drawing is obtained from the project plan prepared by Doğru Muhendislik which is the company's consultant for etude and design of this project.

The emission factors are calculated ex-ante for the period of ten years. The combined margin will be recalculated through ACM0002-Version 21.0.0, any time the crediting period is renewed. Please note that the project is a zero-emission generating activity and no particularly sensitive or critical sustainable development indicator was identified.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions (BE_y) are calculated based on the following formula:

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

Where:

BE_y = Baseline emissions in year y (tCO₂/yr)

EG_{PJ,y} = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr)

EF_{grid,CM,y} = Combined margin CO₂ emissions factor in year y (tCO₂/MWh)

And

$$EG_{PJ,y} = EG_{Facility,y}$$

EG_{Facility,y} = Quantity of net electricity generation supplied by the project plant to the grid in year y (MWh/y)

The Combined margin CO₂ emissions factor in year y (tCO₂e/MWh), EF_{grid,CM,y}, is fixed ex-ante for the duration of the crediting period and is 0.650 tCO₂e/MWh.

The following table is the Baseline emissions of the project calculated for the monitoring period.

Table 6: Baseline emissions of the project calculated for the monitoring period (National Grid Emission Factor EF CM is 0.650 tCO₂e/MWh [fixed ex-ante]).

	*15	A-Gross Electricity Production	B-Self Electricity Consumption	C-Net electricity production C=A-B	Baseline Emissions = $EG_{PP-net,y} * EF_{CM}$
	Symbol	$EG_{export,y}$	$EG_{import,y}$	$EG_{PJ,y}$	BE_y
YEAR	Units	MWh	MWh	MWh	tCO ₂ e
2020	01 October	2,115.632	39.621	2,076.011	1,349.407
	November	5,108.240	24.348	5,083.892	3,304.530
	December	6,496.991	22.729	6,474.262	4,208.270
Total in 2020					8,862.000
2021	January	10,223.511	14.505	10,209.006	6,635.854
	February	16,401.376	0.005	16,401.371	10,660.891
	March	16,543.786	0.021	16,543.765	10,753.447
	April	17,984.019	0	17,984.019	11,689.612
	May	9,642.191	7.034	9,635.157	6,262.852
	June	5,703.364	22.474	5,680.890	3,692.579
	July	3,857.728	35.600	3,822.128	2,484.383
	August	2,914.997	41.209	2,873.788	1,867.962
	September	3,412.734	35.881	3,376.853	2,194.954
	October	2,897.182	40.091	2,857.091	1,857.109
	November	2,738.685	41.510	2,697.175	1,753.164
	December	5,496.769	25.762	5,471.007	3,556.155
Total in 2021					63,408.000
2022	January	8,292.900	8.796	8,284.104	5,384.668
	February	14,892.727	0.085	14,892.642	9,680.217
	March	23,502.095	0.025	23,502.070	15,276.3455
	April	21,069.353	0	21,069.353	13,695.079

¹⁵ The project has not gone under any impairment or maintenance work during the monitoring period that affected electricity generation. Any change observed in production are due to the change in rainfall and river water flow in the area. Please see the General Directorate of Meteorology of Turkey's Precipitation Report for 2022 linked below. The report indicates that 2021 has been a year of low precipitation in the Eastern and Southeastern Regions of Turkey, where Murat HPP project in Adiyaman is located. See Graph no. 6 (pg. 8), the last two groups indicate the above-mentioned regions. Graphs 17 and 19 (pages 14 and 15) detail the yearly rainfall observed in these regions.

<https://mgm.gov.tr/FILES/arastirma/yagis-degerlendirme/2022yagisdegerlendirmesi.pdf>

	May	15,364.276	0.066	15,364.210	9,986.737
	June	9,240.898	0.217	9,240.681	6,006.443
	30 July	4,436.676	14.640	4,422.036	2,874.323
Total in 2022					62,903.000
Grand Total				207,961.511	1,35,173.000

5.2 Project Emissions

As the methodology states the P_{E_y} in case of a hydropower project is calculated:

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO₂e/yr)

For hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH₄ and CO₂ emissions from the reservoir, estimated as follows:”

“...the power density of the project activity (PD) is greater than 4 W/m² and less than or equal to 10 W/m²:”

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

The calculation is as follows:

$Cap_{PJ} = 35,478,000$ W

$Cap_{BL} = 0$ (The Project is a new hydro power plant)

$A_{PJ} = 640,471.91$ m²

$A_{BL} = 0$ (The Project is a new hydro power plant)

$PD = (35,478,000 - 0) / (640,471.91 - 0) = 55.39$ W/m²

Therefore;

The project has a power density of 55.39 W/m² therefore:

$PE_{HP,y} = 0$

Where:

$PE_{HP,y}$ = Project emissions from water reservoirs (tCO₂e/yr)

Although there are auxiliary diesel generators installed within the project boundary, the emissions from these have been deemed negligible, as the ACM0002 (version 13.0.0)

methodology states that: “The use of fossil fuels for the back up or emergency purposes (e.g. diesel generators) can be neglected.” (pg. 6)

5.3 Leakage

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing and transport). These emissions sources are neglected.

5.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

ER_y = Emission reductions in year y (tCO₂e/yr)

BE_y = Baseline emissions in year y (tCO₂e/yr) (Please refer to section 5.1)

PE_y = Project emissions in year y (tCO₂e/yr) (Please refer to section 5.2)

LE_y = Leakage in year y (tCO₂e/yr) (Please refer section to 5.3)

Hence,

$$ER_y = BE_y - PE_y$$

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)
2020 (01.10.2020-31.12.2020)	8,862.00	0	0	8,862.00
2021 (01.01.2021-31.12.2021)	63,408.00	0	0	63,408.00
2022 (01.01.2022-30.07.2022)	62,903.00	0	0	62,903.00
Total	135,173.00	0	0	135,173.00

<u>Ex-ante emissions reductions/removals for the current monitoring period</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
179,215.00 tCO ₂ e	135,173.00 tCO ₂ e	-%24.57	The ex-ante emission reduction estimations were made in 2012. Since then, the region has been heavily affected by diminishing rainfall and draught. Accordingly, the Göksu River has a lower water volume, and thus the Murat HEPP project activity is able to generate less electricity. This has resulted in lower emission reductions than the initial estimations.

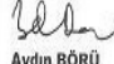
6 APPENDIX 1: EIA NON-REQUIREMENT CERTIFICATE

T.C.
ADIYAMAN VALİLİĞİ
İL ÇEVRE VE ORMAN MÜDÜRLÜĞÜ

Karar Tarihi :22/04/2009
Karar No : 29

ÇED GEREKLİ DEĞİLDİR BELGESİ

16 Aralık 2003 tarih ve 25318 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği'nin Ek-II listesinde yer alan "Murat HES1(24,08 MW) ve Murat HES2(13,14 MW) Hidroelektrik Santrali " Projesi ile ilgili olarak inceleme değerlendirme yapılmış ve Proje Tanıtım Dosyasında çevresel etkilere karşı alınması öngörülen önlemler yeterli görülmüştür. Ayrıca ÇED Raporu hazırlanmasına gerek bulunmadığı tespit edilmiş olup, söz konusu projeye ÇED Yönetmeliğinin 17. Maddesi gereğince Valiliğimizce "Çevresel Etki Değerlendirilmesi Gerekli Değildir Kararı" verilmiştir.


Aydın BÖRÜ
Vali a.
Vali Yardımcısı

Proje Sahibi : Murat HES Enerji Elektrik Üretim ve Tic.Ltd.Şti.
Projenin Yeri: Adıyaman İli Merkez İlçesi Yeniköy köyünden başlayıp Besni İlçesi umutlu köyüne kadar Göksu çayı üzerinde
(Regülatör: Y-416500 X:4176000)
(Murat HES1:Y-419700 X:4165400)
(Murat HES2: Y-423000 X:4158500)