MIDILLI HYDROELECTRIC POWER PLANT

Document Prepared by Life Enerji

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Midilli Hydropower Plant, Turkey, which is developed by Masat Enerji Elektrik Üretim ve Ticaret A.Ş. (hereafter referred to as the "Project Owner") is a run-of-river hydropower project located in Amasya province Center district and Kızılkışlacık village, Turkey and has 32.55 MWe installed capacity. It utilizes the water head on the Yeşilırmak River to generate and supply electricity from clean and renewable resources.

The Project Activity (PA) utilizes the Yeşilırmak river water in a diversion-type run-of-river hydro power scheme to generate electricity with zero carbon emissions for the Turkish Power Grid. The PA will be displacing electricity that would otherwise be generated by the existing grid of the host country. Annual gross electricity production by the PA was estimated to be 124,050 MWh during the registration of the project under VERRA.

Midilli HPP produces GHG emission free, clean electricity, which is fed into the national Turkish grid. The electricity supplied to the national grid is mainly dominated by thermal power plants in existing situation. Midilli HPP displaces power generation by thermal power plants, which leads to savings in fuel combustion and thus to the reduction of GHG emissions.

The electricity produced by project activity will produce 124,050 MWh electricity per year and result in an emission reduction of 57,308 tonnes of CO_2e/year and total emission reduction by the project activity is estimated to be 573,080 tonnes of CO_2e as per ACM0002 "Grid-connected electricity generation from renewable sources" v.21.0 for the second crediting period, which is 27-December-2022 to 26-December-2032.

The third monitoring period for first crediting period covers the two years and six months from 01-July-2020 to 26-December-2022 (both days included). Total emission reductions achieved in this period are 48,647 tons of CO_2e.

Audit Type	Period	Program	VVB Name	Number of years
Validation	27/12/2021-26/12/2022	VCS	TÜV Rheinland Energie und Umwelt GmbH	10 years
Verification	27/12/2012-30/06/2014	VCS	TÜV Rheinland Energie und Umwelt GmbH	1 year and 6 months
Verification	01/07/2014-30/06/2020	VCS	Rina Services S.P.A.	6 years
Validation/ Verification	01/07/2020-26/12/2022	VCS	Applus	2 years and 6 months

Total	27/12/2012-26/12/2022			10 years

1.2 Sectoral Scope and Project Type

Title: Grid Connected Renewable Electricity Generation (Sector 1)

Reference: ACM0002 (Version 21.0)[1]

Midilli HPP is a grid connected hydro power plant with 32.55 MWe installed capacity. Regarding project emissions of hydropower plants, ACM0002 refers to where PD (power density) of the water reservoir is considered for the determination of reservoir emissions. Thresholds and calculation procedures defined there though are only applicable to projects with new reservoir capacity.

Since the project activity is a hydropower plant, the respective sectoral scope is scope 1: "Energy Industry – Renewable/Non-renewable Sources". The project participant hereby confirms that this is not a grouped project.

1.3 Project Eligibility

Midilli HPP is classified in the Renewable Energy Source category as electricity from non-fossil and non-depletable energy sources, in this case from hydro power, is fed into the Turkish electricity grid.

1.4 Project Design

The project is in a single location and installation which is Amasya province and it is not a grouped project activity.

Eligibility Criteria

This is not a grouped project activity.

1.5 Project Proponent

Organization name	Masat Enerji Elektrik Üretim ve Ticaret A.Ş.
Contact person	Merve Balcı
Title	Energy Investments and Operations Manager
Address	Ömer Avni Mh. İnönü Cd. Devres No:50 Beyoğlu/Istanbul

[1] Please see https://cdm.unfccc.int/methodologies/DB/HF3LP6O41YY0JIP1DK6ZRJO9RSCX3S

Telephone	+90 212 240 2820
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1.6 Other Entities Involved in the Project

Organization name	Life İklim ve Enerji Ltd. Şti.
Role in the project	Project Consultant
Contact person	Nazire Gür
Title	Project Expert
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1.7 Ownership

The Project is owned by Masat Enerji Elektrik Üretim ve Ticaret Anonim Sirketi.

1.8 Project Start Date

Project start date is 27-December-2012 that is the first GHG emission reductions.

1.9 Project Crediting Period

Commissioning date of the project is 27-December-2012.

10 years two-times renewed crediting period.

First Crediting Period:

Start: 27-December-2012

End: 26-December-2022

Second Crediting Period:

End: 27-December-2022

End: 26-December-2032

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	x
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
27-December-2022 to 31-December-2022	784
2023	57,261
2024	57,418
2025	57,261
2026	57,261
2027	57,261
2028	57,418
2029	57,261
2030	57,261
2031	57,261
01-January-2032 to 26-December-2032	56,633
Total estimated ERs	**573,080**
Total number of crediting years	10
Average annual ERs	**57,308**

1.11 Description of the Project Activity

The 32.55 MWe[2] Midilli HPP produces electricity for transmission into the national grid. For this purpose, it utilizes the water head on the Yesilırmak River to generate and supply electricity from clean and renewable resources. The Project Activity is comprised of the following main parts: a diversion weir to divert the water, a channel connected by two conveyance tunnels and the powerhouse where the turbines are housed. Water will be collected by a controlled weir. The weir will also include two spillway gates, a spill water crest and a fish gate on the left bank. Water will enter the weir from an intake structure and leave the weir from the outlet gates into a 13,435 m conveyance tunnel-channel system. The water will then pass to the turbines via a surge tank and a penstock of 230 m. A gross head of 152 m will be formed (net head 132.14 m) and water will be discharged into four Francis turbines, which are contained within the powerhouse. The electricity will be transmitted via 34.5 kV transmission lines through Yenidere Havza transformer substations, via 11 km transmission line. The Project Activity will implement the best available technology and management standards.

To summarize the technical description of the Project Activity, the main technical characteristics obtained from final revised and DSİ approved feasibility report and latest information based on the final water usage agreement of the Project Activity and its general properties of the facilities are provided below:

Table 1. Technical Characteristics of Midilli HPP

INFORMATION ABOUT INVESTMENT REGION	
1/25.000 Sized Map Names	G35-c2, G36-d1
Project Coordinates	36º01'17.1''E, 40º44'6.91''N
Province	Amasya
District	Taşova
Basin Name	Yeşilırmak
River Name / Main Branch Name	Yeşilırmak
Catchment Area (km2)	21,542.80 km²
Average Flow Rate (m3/sec)	46.42 m³/sec
Average Annual Total Flow (hm3)	1,553.48 hm³
Q.....Dam spillway design flow rate (m3/sec)	780.7 m³/sec
REGULATOR TYPE	
Regulator Type	Regulator Type
Crest Altitude (m)	380 m
Maximum Operating Level (m)	378 m

[2] Please see, generation license

Minimum Operating Level (m)	371 m
Thalveg Altitude (m)	371 m
Powerstation Tail Water Altitude (m)	340 m
Transmission Structure Type	Channel + Tunnel
Transmission Structure Length (m)	13,435 m
Transmission Structure Slope (j)	0.00015(K)/0.00032(T)
PENSTOCK / CHANNEL / TUNNEL	
Penstock Diameter (m)	3 x 3 m + 1 x 1 m
Penstock Length (m)	230 m
Penstock Wall Thickness (mm)	8 mm
TURBINE INFORMATION	
Turbine Type	Francis
Number of Units	4
Gross Head (m)	4 x 38.00 m
Net Head (m)	3 x 33.94 m; 1 x 30,32 m
Project Flow Rate (m3/sec)	3 x 34.23 m^3/sec - 1 x 4 m^3/sec
GENERATOR INFORMATION	
Installed Capacity (MW)	32.548 MW
Total Energy (GWh)	124,050 GWh
Dam Voltage (kV)	3 x 10.6 kV; 1 x 6.3 kV
Energy Transmission Line Section	33 kV
Energy Transmission Line Length (km)	11 km

The project will be using Four Francis type turbines. The working principle of the Francis turbine is such that the water coming from the penstock is transferred to the inlet scroll, which distributes the water equally around the wicket gates. Water passes through the wicket gates, which controls the amount of water passing through the turbine, before reaching the runner. This in effect controls the power output of the hydroelectric power plant. The wicket gates also adjust the angle of the water reaching to the runner. After passing through the wicket gates, the water reaches the runner. The water pressure forces the runner to rotate. The rotation speed of the runner can be in the range of 80 to 1000 revolutions per

minute. The water continues its motion downward under the runner to the exit pipe. The exit pipe discharges the water to the environment as low pressure water. The rotational motion of the runner is transferred to an electric generator. The generated electricity is converted to a high voltage current and is transferred to the grid to be consumed. The following figure exhibits the working principle of a Vertical axis Francis Turbine.

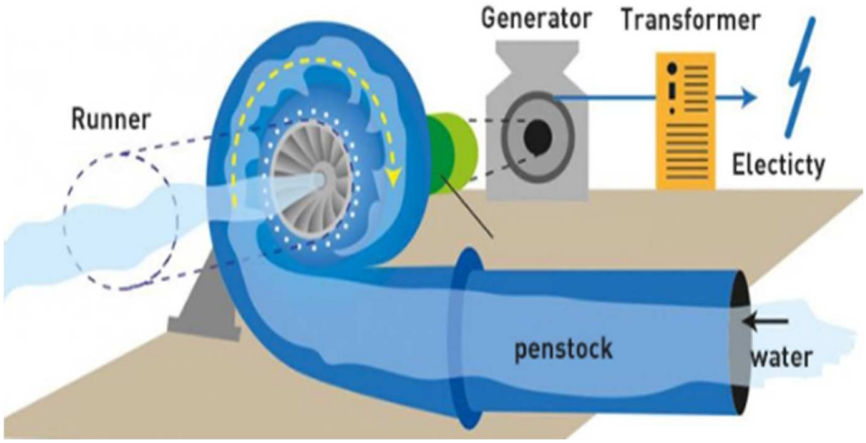

Figure 1. Illustration of Francis Turbine [3]

The project owner is granted a production license for 49 years The economic life time of a hydro power plant investment is assumed to be about 50 years, based on the experts' committee report on energy under the 8th development plan published by the State planning organization. Even if the facility can last for 50 years the major equipment needs to be replaced in every 20 years.

The project is expected to produce 124,050 MWh of electricity per year, over the first crediting period. The annual electricity delivered to the grid by the project, would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. Based on this a combined margin emission reduction factor is calculated as detailed below in Chapter 3 of this document.

1.12 Project Location

The host party is the Republic of Turkey. The Project is located at the Black Sea Geographical Region/ Amasya Province's Center District and Kızılkışlacık village. The following are the exact coordinates of the main project structures, as shown in the following figure below.

Table 2: GPS coordinates of the Weir and the Powerhouse[4]

[3] Picture is taken from: http://m.savvy-ind.com/water-turbine/francis-tubine/micro-francis-water-turbine-generator-set.html

[4] Please see for the conversion: http://rcn.montana.edu/Resources/Converter.aspx

	Diversion Weir	Powerhouse
Latitude	40°41'14.56'' N	40°44'6.91''N
Longitude	35°53'56.58'' E	36°01'17.1''E

Figure 2. Project Location

1.13 Conditions Prior to Project Initiation

The pre-project scenario is same as baseline scenario. Please refer Section 3.4 (Baseline Scenario) for the description of baseline scenario.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

Laws as relevant to the project are (Law No. and Publication Date in Official Gazette):

(1) Electricity Market Law (6446, 30-03-2013)[5]

(2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy (5346, 18-05-2005)[6]

(3) Environment Law (2872, 11-08-1983)[7]

(4) Occupational Health and Safety Law (6331, 30-06-2012)[8]

[5] See: https://www.resmigazete.gov.tr/eskiler/2013/03/20130330.pdf

[6] See: https://www.resmigazete.gov.tr/eskiler/2005/05/20050518-1.htm

[7] See http://www.mevzuat.gov.tr/MevzuatMetin/1.5.2872.pdf

[8] See: http://www.mevzuat.gov.tr/MevzuatMetin/1.5.6331.pdf

(5) Forest Law (Nr. 6831)[9]

The renewable Energy generation license for Midilli HPP has been issued considering Electricity Law and Law in utilization of Renewable Energy Resources for generating electricity energy. The proposed project is also in compliance with Energy Efficiency Law. Environment Law is also satisfied, and it has been confirmed by Ministry of Environment that the Midilli HPP is not subject to comprehensive Environmental Impact Assessment (EIA) Report preparation based on the screening conducted according to EIA Regulation. Forest Law, which specifies that forest areas can be allocated by Ministry of Environment and Forestry to institutions or individuals for energy, plants if the project implementation serves common good for public. As in Turkey there is no applicable local regulations to HPP constructions the list above includes national regulation only.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has not been registered and seeking registration under any other GHG programs.

1.15.2 Projects Rejected by Other GHG Programs

Midilli HPP has not applied for crediting under any other GHG program, nor has it been rejected from any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

Not applicable: The project activity is neither included in an emissions trading program nor does it take place in a jurisdiction or sector in which binding limits are established on GHG emissions.

1.16.2 Other Forms of Environmental Credit

The project has not created any form of other credit. Masat Enerji Elektrik Üretim ve Ticaret Anonim Şirketi does not obtain any public funding.

1.16.3 Supply Chain (Scope 3) Emissions

Midilli HPP project is generating renewable energy by using hydro power and supply to the national grid. There is no product other than the electricity generated by Midilli HPP. Therefore, the project cannot affect Scope 3 emissions.

1.17 Sustainable Development Contributions

[9] See: https://www.mevzuat.gov.tr/MevzuatMetin/1.3.6831.pdf

1.17.1 Sustainable Development Contributions Activity Description

The project is expected to contribute 3 SDGs which are SDG 7, 8, and 13 for the second crediting period.

SDG 7 Energy: The project contributes SDG Target 7.2 "By 2030, increase substantially the share of renewable energy in the global energy mix" and Indicator 7.2.1 by the utilization of hydro power as a renewable energy source.

SDG 8 Decent Work and Economic Growth: During the operation phase of the project, job opportunities are created. Therefore, the project contributes to SDG Target 8.8 "Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment" and Indicator 8.8.2 by providing employment and job-related training to the employees. SGK (Social Security Institution) Records and HSE training certificates will be provided during each monitoring period.

SDG 13 Climate Change: The project produces clean renewable energy by diminishing CO_2 emissions. Therefore, it contributes SDG Target 13.3 "Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning" and Indicator 13.3.2.

1.17.2 Sustainable Development Contributions Activity Monitoring

Midilli HPP is located at the Black Sea Geographical Region/ Amasya Province. Electricity generated by the project is fed into the national electricity grid, displacing energy that would otherwise be generated by fossil fuels. The project facilitated 94,672.86 MWh renewable electricity generation, 48,647 tCO_2e during its third monitoring period[10].

[10] Project's fourth monitoring period is in between 01-July-2020 to 26-December-2022.

Table 3: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	13.3	13.3.1 Air Quality	Electricity generation from Hydro Power Plant to decrease CO_2 emission	48,647 tCO_2 emission reduction during this MP	263,174 tCO_2 emission reduction over the project lifetime (27-December-2012 to 26-December-2022)
2)	8.8	8.8.2 Level of national compliance with labour rights (freedom of association and collective bargaining) based on International Labour Organization (ILO) textual sources and national legislation, by sex and migrant status	Implemented activities to increase	During the monitoring period, total of 14 workers has been employed in this monitoring period.	Since the operation start date of the Plant, the Project has employed a total of 14 workers.
3)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Electricity generation from Hydro Power Plant	94,672.86 MWh during this MP	512,044 MWh over the project lifetime (27-December-2012 to 26-December-2022)

1.18 Additional Information Relevant to the Project

Leakage Management

There is no leakage management as per applied methodology ACM0002, Version 21.0.

Commercially Sensitive Information

Commercially sensitive information has been excluded from this document.

Sustainable Development

Project developer believes that efficient utilization of all kinds of natural resources with a harmony coupled with responsible environmental considerations is vital for the sustainable development of Turkey and the World. This has been a guiding factor for the shareholders towards the concept of designation and installation of a hydro power project. Other than the objective of climate change mitigation through a significant reduction in greenhouse gas (GHG) emissions, the project has been carried out to provide a social and economic contribution to the region in a sustainable way. The benefits that are gained by the realization of the project compared to the business-as-usual scenario can be summarized under some main indicators. As per World Future Council's report, renewable energy power plants have positive environmental impacts and economic impacts. Moreover, renewable energy power plants help to ensure energy and economic security of the country. The benefits that will be gained by the realization of the project compared to the business-as-usual scenario can be summarized under four main indicators:

Environmental

The project activities will replace the grid electricity, which is constituted of different fuel sources causing greenhouse gas emissions. By replacing in the consumption of these fuels, it contributes to conservation of water, soil, flora and faunas and transfers these natural resources and also the additional supply of these primary energy sources to the future generations. In the absence of the project activity, an equivalent amount of electricity would have been generated from the power plants connected to the grid, majority of which are based on fossil fuels. Thus, the project is replacing the greenhouse gas emissions (CO_2, CH_4) and other pollutants (SO_X, NO_X, particulate matters) occurring from extraction, processing, transportation and burning of fossil-fuels for power generation connected to the national grid.

Economical

Firstly, the project will help to accelerate the growth of the hydro power industry and stimulate the designation and production of renewable energy technologies in Turkey. Then, other entrepreneurs irrespective of sector will be encouraged to invest in hydro power generations. It will also assist to reduce Turkey's increasing energy deficit and diversify the electricity generation mix while reducing import dependency, especially natural gas. Importantly, rural development will be maintained in the areas around the project site by providing infrastructural investments to these remote villages.

Social

Local employment will be enhanced by all project activities during construction and operation of the hydro power plant. As a result, local poverty and unemployment will be partially eliminated by increased job opportunities and project business activities. Construction materials for the foundations, cables and other auxiliary equipment will preferentially be sourced locally. Moreover, as contribution of the project to welfare of the region, the quality of the electricity consumed in the region will be increased by local electricity production, which also contributes decreasing of distribution losses.

Technological

Implementation of the proposed project will contribute to wider deployment of hydro power technology in local and national level. It will demonstrate the viability of larger grid connected hydro power plants, which will support improved energy security, alternative sustainable energy, and renewable energy industry development. This will also strengthen pillars of Turkish electricity supply based on ecologically sound technology.

Further Information

Not applicable

2 SAFEGUARDS

2.1 No Net Harm

No negative environmental and socio-economic impacts have been observed/recorded for this project. The potential socio-economic impact was agricultural water. To overcome this, a line was built to feed agricultural water channel and it is fed whenever needed. Detailed information of Midilli HPP's social and environmental performance can be gained via Sustainable Development chapter.

2.2 Local Stakeholder Consultation

During planning and construction phases, local stakeholders have been contacted by the project owners to inform them about the Project, and to gather their comments. The common outcome of these meetings was positive and contacted stakeholders are in favor of the Project according to the registered PD.

For the grievance mechanism, mukhtar (head of the village) has taken the contact information of Company Executive of the company so that the local stakeholders can reach company executive whenever they have any complaints, suggestions or ideas about the project. Since mukhtars are the head of the villages, they are the contact persons between the project owner and the local stakeholders. Mukhtars of the villages will make sure that there's continuous communication between the two parties.

Regarding for this monitoring period and renewable of crediting period, stakeholder meeting procedure was conducted with the local stakeholders and Midilli HPP personnel via on site meeting on 16-May-2023 at Midilli HPP administration building that is located in Amasya Province, Center District and Kızılkışlacık village, and no complaints or problems were recorded regarding the Midilli HPP. As a result, no negative feedback has been received from Midilli HPP personnel or local people and a letter that

states no complaint received until the date of site visit has been signed by the Mukhtar has been provided to VVB.

2.3 Environmental Impact

In Turkey, there are 35 Nature Preservation Area[11] and 33 National Parks[12]. The project is not located in any of these. Furthermore, in Turkey, there are 58-registered Monument of Nature[13] and 16 registered Nature Park. None of these Monuments of Nature and Nature Parks is located in the project area.

According to the relevant Environmental Impact Assessment Regulation, a full Environmental Impact Assessment Report is not required. The official letter from Environment and Forestry Ministry confirming non-applicability of full EIA Process has been available during re-validation process.

Environmental benefits

The project helps Turkey to stimulate and commercialize the use of grid connected renewable energy technologies and markets. The specific economic, social and technological benefits are:

- Reducing Turkeys expanding energy deficit;
- Diversification of Turkish electricity generation mix and reduction of import dependency;
- Creation of local employment and income during construction and operation of HPP (directly as well as indirectly via contracts with local providers for supply of construction material);
- Foster infrastructural investments with connected development benefits to the local rural community in the remote project area;
- Making rural electricity supply more reliable, better available and cost efficient thanks to decreasing distances between generation and consumption points.

2.4 Public Comments

There are no public comments.

2.5 AFOLU-Specific Safeguards

This is a non-AFOLU project.

[11] https://www.ktb.gov.tr/EN-99884/natural-protection-areas.html

[12] https://www.ktb.gov.tr/EN-99769/national-parks.html

[13] https://www.ktb.gov.tr/EN-99825/nature-monuments.html

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Title: Grid Connected Renewable Electricity Generation

Reference: ACM0002 (Version 21.0)[14]

For the determination of the baseline, Version 21 of CDM approved baseline and monitoring methodology ACM0002 – "Grid-connected renewable electricity generation" is applied. For baseline calculations, ACM0002 refers to the "Tool to calculate the emission factor for an electricity system", Version 7.0. Additionality is demonstrated via application of the "Tool for the demonstration and assessment of additionality", Version 07.0. The methodology is used in conjunction with the following tools:

1. TOOL07 - Tool to calculate the emission factor for an electricity system (Version 07.0.0)[15]
2. TOOL01 - Tool for the demonstration and assessment of additionality (Version 07.0.0)[16]
3. TOOL10 - Tool to determine the remaining lifetime of the equipment (Version 01.0.0)[17]
4. TOOL11 - Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1)[18]

3.2 Applicability of Methodology

The choice of methodology ACM0002 Version 21 is justified as the proposed project activity meets the relevant applicability criteria:
The Hydroelectric Power Plant Project involves installation 32.55 MWe grid connected renewable electricity generation plant,

The methodology is applicable under the following conditions:

- The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2. In addition, as in the case of Midilli HPP this density is above the 10 W/m^2 threshold (1251.85 W/m^2; reservoir size: 26,000 m^2, installed capacity: 32,548,000 W). Hence, the project emission ($PE_{HP,y}$) is zero in line with the section [5.4.3 – 38 – c) – Equation (10)] of the ACM0002 methodology.
- The project activity is the installation of a hydro power plant with a run-of-river reservoir.
- The project activity is not capacity additions, retrofits or replacements.

[14] Please see https://cdm.unfccc.int/methodologies/DB/HF3LP6O41YY0JIP1DK6ZRJO9RSCX3S

[15] Please see https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

[16] Please see https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[17] Please see http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

[18] Please see https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

- Project activities do not involve switching from fossil fuels to renewable energy sources at the site of the project activity.
- Project activity is not a biomass-fired power plant.

The methodology is applicable as the proposed project is a grid connected greenfield hydropower plant project with a power density greater than 4 W/m^2. Hence, the approved consolidated methodology ACM0002 Version 21 is applicable to the project activity.

In addition, for the emission factors, that were used to calculate estimated emission reductions, publication of Turkish Ministry of Energy and Natural Resources, which is indicating Turkey's National Electric Grid Emission Factor for the year of 2020 was used. Publication includes calculated Emission Factor values that are Operating Margin (OM), Growth Based Margin (Build Margin-BM) and Combined Margin (CM) Emission Factors, for the relevant year (which is 2020) with usage of the IPCC's Clean Development Methodology Tool 07-V06.0. For this calculation, information regarding used data set is given detailed in section 4.1 of this document.

In brief, the latest version of the Turkish National Electricity Grid Emission Factor was published in 2022 and the Emission Factors included in this document belong to the 2020 calculation period[19]. Therefore, the recent available data of the emission factors (the data set used for calculation of emission factors also belongs to 2020.) used in the calculation of the baseline scenario belongs to 2020.

Emission factor calculation is not given in detail in the document published by the Turkish Ministry of Energy and Natural Resources. However, the most recent data and official values for emission factor of Turkey are those published in this report (Please see: https://enerji.gov.tr/evced-cevre-ve-iklim-turkiye-ulusal-elektrik-sebekesi-emisyon-faktoru).

3.3 Project Boundary

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

Greenhouse's gases included in the project boundary and used in calculations of emission reductions are given in Table 3 below.

Table 4: Emissions sources included in or excluded from the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due	CO_2	Yes	Main emission source: Fossil fuels fired for electricity generation cause CO_2 emissions. It is included to baseline calculation to find the displaced amount by the project activity.
		CH_4	No	Minor emission source. Excluded for simplification. This is conservative

[19] Please see: https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/T%C3%BCrkiyeUlusalElektrik%C5%9EebekesiEmisyonFakt%C3%B6r%C3%BC/Belgeler/EK-2.pdf

Source		Gas	Included?	Justification/Explanation
	to the project activity	N_2O	No	Minor emission source. Excluded for simplification. This is conservative
Project	Emissions of CH_4 from the reservoir	CO_2	No	Minor emission source. The project activity will not create a new reservoir. Therefore, there will not be any project emission. This is conservative.
		CH_4	No	
		N_2O	No	

3.4 Baseline Scenario

The methodological tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0.1) is adopted to assess the continued validity of the baseline and to update the baseline. This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. According to this tool, the following steps are applied.

Step 1: Assess the validity of the current baseline for the next crediting period

The validity of the current baseline is assessed using the following Sub-steps:

Sub Step 1.1 Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies.

The project baseline is the "Grid-connected electricity generation". It complies with the current legal framework. There are no additional laws that came into force that has an impact on the project activity and the project activity is still in line with the available law and regulations.

Sub Step 1.2 Assess the impact of circumstances.

The new national circumstances have an impact on the EF of the grid and thus on the project's current baseline emissions. Accordingly, the EF is updated for the second crediting period in conformity with the latest version of the publication of the Turkey's National Electric Grid Emission Factor for the year of 2020. There has been no major deviation or change in the market characteristic during the first crediting period.

Sub Step 1.3 Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

The technical lifetime of the equipment, (hydro turbines) is 20 years and lifetime exceeds the crediting period for which renewal is requested. Equipment only requires regular maintenance. The baseline scenario identified at the validation of the project activity was the continuation of grid-connected electricity generation. Under this scenario, no investment from the project's proponent or third party (or parties) has been envisioned later specifically for the project.

Sub Step 1.4 Assessment of validity of the data and parameters.

The emissions reduction calculations are based on two main parameters: the energy produced and the grid emission factor. The latter will be updated as explained in the next paragraph. As a requirement of the methodology, only the grid emission factor has been updated during the second crediting period renewal.

Step 2: Update the current baseline and the data and parameters

Sub Step 2.1: Update the current baseline

As confirmed in Step 1, under the current context of the sectoral policies and circumstances, the project baseline for the next crediting period is the use of electricity from the national grid. This is conformed to the provisions of the latest version of the approved applicable methodology. Therefore, there has been no deviation in the baseline scenario.

Sub Step 2.2: Update the data and parameters

The grid emission factor is updated according to the publication of Turkish Ministry of Energy and Natural Resources that is indicating Turkey's National Electric Grid Emission Factor for the year of 2020.

Only parameter will be monitored for second crediting period is "$EG_{PJ,\text{facility},y}$" which is related to electricity production.

3.5 Additionality

The proposed project activity reduces GHG emissions by substituting fossil fuel based electricity generation by renewable resources (hydro) based electricity generation.

This part refers to the "Tool for the Demonstration and Assessment of Additionality Version 7.0.0" and the numbering in this section reflects the Tool's Guidelines provided at EB 70, Annex 8.

Step 1 - Identification of Alternatives to the project activity consistent with current laws and regulations

Sub-step 1a - Define alternatives to the project activity:

The tool notifies that "Project activities that apply this tool in context of approved consolidated methodology ACM0002, only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity."

The project alternative can be defined as follows:

Continuation of the current situation (No project activity or other alternatives undertaken). This alternative is the most likely scenario, since there are no legal obligation to implement such a project and without VCS support the project implementation is financially not attractive.

Outcome of Step 1a: The only realistic and credible alternative scenario to the project activity is Continuation of the current situation, without any project undertaken.

Sub-step 1b. Consistency with mandatory laws and regulations:

The project alternative, the baseline scenario, which is the continuation of the existing situation, is in compliance with all mandatory applicable and legal and regulatory requirements. Also, the alternative scenario of addition of a new power generation capacity to the grid is regulated by Energy Market Regulatory Authority (EMRA) who issues the licenses for electricity generation and is responsible for ensuring that new capacity applies with its rules and regulations. The list of the rules and regulations of the host country that a new electricity generation project has to comply with is given in Annex 1.

Outcome of Step 1b: The alternative scenario to the project activity is the supply of electricity by the existing grid with additional capacity is in compliance with mandatory legislation and regulations.

Step 2 - Investment analysis

At this step it will be demonstrated that "the proposed project activity is not the most economically or financially attractive" option. Please note that, at this step, the "Guidelines on the assessment of investment analysis" (EB 62 Report Annex 5) Version 05 is followed.

Sub-step 2a - Determine appropriate analysis method

There are three options for investment analysis method:

- Simple Cost Analysis
- Investment Comparison Analysis and
- Benchmark Analysis

"Simple Cost Analysis" is not applicable for this project activity as the project generates economic benefits from sale of electricity to the Turkish national grid". Investment Comparison Analysis is also eliminated since the baseline for the project is "the generation of electricity by the existing grid" and no similar investment alternatives exist. Therefore, Benchmark Analysis is the most appropriate approach for the evaluation of the project activity.

Sub-step 2b - Option III-Apply benchmark analysis

Internal Rate of Return (IRR) on equity is taken for this project to be the financial indicator for assessing the financial viability of the project activity.

Equity IRR is the cash flow return to equity shareholders after debt repayments. And therefore also takes into account the debt repayments. Equity IRR takes into consideration that you use debt for the project, so the inflows are the cash flows required minus any debt that was raised for the project. The outflows are cash flows from the project minus any interest and debt repayments.

To be able to assess the financial viability of the project a benchmark to compare the equity IRR is needed.

The Tool for the Demonstration and Assessment of Additionality Version 7.0.0 (EB 70, Annex 8) and the Guidelines issued at EB 62 state that "…Discount rates and benchmarks shall be derived from: Government bond rates, increased by a suitable risk premium to reflect private investment and/or the

project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data"

The Guidelines issued at EB 62, provides the default values for the expected return on equity as an appendix, and Moody's index values of most of the CDM Countries. At the time of investment decision (2007 see table 1), Turkey's Moody's index (Ba3-Stable between 2005 to 2009) was comparable to country's with the same Moody's index, and same default benchmark value from this point of view a reasonable and appropriate benchmark to compare the Equity IRR can be taken as 12.75 %.

Sub-step 2c - Calculation and comparison of financial indicators

The following parameters are taken into account for the assessment of the investment (Table 5) and supplementary parameters are provided in the "Midilli Financial Analysis" workbook and submitted to the validating DOE

Table 5 Major parameters taken into account for the financial analysis and determination of the Equity IRR of the Midilli HPP Project:

Parameter	Value	Unit	References
Installed Capacity	32.55	MWe	Electricity Generation License of the project activity.
Expected Annual Electricity Generation	124,050	MWh/year	Electricity Generation License of the project activity page 6 and page 243 of revised feasibility report.
Expected Average Annual Emission Reduction (ER)	63,761	tCO_2e	Calculated (see Chapter 3 for details) based on the electricity production values.
Total Investment	Confidential	USD	Based on FSR and based on VAT calculations
Annual Operation Costs	Confidential	USD	Based on FSR and based on labour cost calculations.
Loan	Confidential	USD	Loan Agreement
Loan Period	10	years	Loan Agreement
Electricity Sales Price	0.073	USD/KWh	Price Guaranteed by the renewable energy law number 5346
VAT	18	%	V.A.T. Law No:3065
Income Tax	20	%	Income Tax Law number 5281

The value of the investment has been depreciated on a reducing balance basis over 20 years, 75 % of the long lasting assets are depreciated over 45 years and the residual book value of 23,527,547.55 USD is added back to the cash flow. The economic life time of a hydro power plant investment is assumed to be about 50 years, based on the experts' committee report on energy under the 8th development plan

published by the State planning organization. Even if the facility can last for 50 years the major equipment needs to be replaced in every 20 years. As a result the project lifetime is estimated to be about 20 years and the investment analysis is therefore done for a time frame of 20 years.

For the assessment of the viability of the project activity the Equity IRR is compared to the benchmark. The equity IRR is worked out as 10.32 %, which is below the benchmark of 12.50%.

Sub-step 2d - Sensitivity Analysis

To be able to conclude if the investment decision is the financially the most attractive alternative or not, a sensitivity analysis is performed. Three parameters that affect the equity IRR are examined for the sensitivity analysis:

- Investment Cost
- Operating and Maintenance Cost
- Electricity Revenue

The sensitivity analysis is performed for a range of ±10% fluctuations in the above parameters. The figures in the following table (Table 6) are obtained. Following the "Guidelines on the assessment of investment analysis (Version 05)" of EB 62 Annex 5 when any of the key variables are increased or decreased by at least 10%, and the benchmark is not exceeded.

Table 6: Sensitivity analysis for the Equity IRR without carbon revenue for the project (Benchmark: 12.75%)

Change	-10%	-5%	5%	10%	Exceed Benchmark?
Investment Cost	12.46%	11.30%	9.47%	8.73%	No
Operating Cost	10.41%	10.37%	10.28%	10.23%	No
Electricity Revenue	8.97%	9.65%	10.98%	11.63%	No

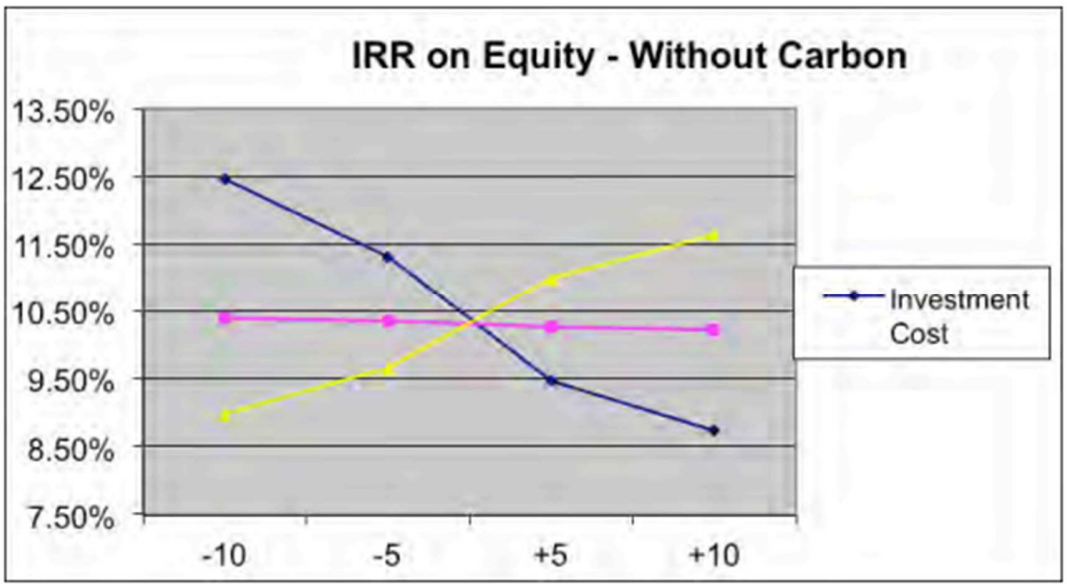

Figure 3. Sensitivity analysis: Fluctuation of the Equity IRR without the carbon revenue, by changing major parameters that effect the Equity IRR by ±10%

To exceed the benchmark, the electricity revenue must increase by about 18.70 % over the life of the project, or the investment cost must be reduced by about 11.13 %. The Renewable energy law only guaranties a minimum price of USD 0.073 per kWh for renewable energy and the price , and the price that was announced at the EMRA web site was approximately 6.4 US cents14,, indicating that our estimation for the renewable energy price was reasonable. However, we do not expect an increase in the electricity revenue related to a price increase and since the feasibility report and the design of the project is based on the maximum available capacity of the Yeşilırmak river, and since our entire financial analysis is based on the maximum net electricity output of the project, such an increase based on an increased amount of electricity generation is very unlikely. In addition to that as the availability of the water decreases due to the globally accepted results of global climate change, electricity production is very unlikely to reach to an increased generation amount of an additional 18.70 %. In addition to this the climate change models indicate for the Mediterranean basin an increased drought and water scarcity that could even risk the project to reach the firm energy values

The investment costs we have considered in our financial analysis was based on the third party prepared revised feasibility report that was available to the project owner at the time of investment decision. Therefore these numbers are reasonable and reflect the average market conditions but are unlikely to go down, as the focus of the project developer is to secure and improve the electricity yield and therefore they will not be able to cut costs. Therefore it is very unlikely for the investment cost to finalize below the amounts estimated and shown in the financial analysis.

Outcome of Step 2:

Without the VER revenue the Internal Rate of Return of the project cannot get close to the benchmark of 12.50 %, with an equity internal rate of return of 10.32%. A fluctuation of ± 10% in the key parameters also does not make the project exceed the benchmark.

Step 3 - Barrier Analysis

As the investment analysis concludes that the proposed project activity is unlikely to be the most financially attractive option, the sub step 3- Barrier analysis is optional to be applied and barrier analysis is not considered for the Midilli HPP.

Step 4: Common Practice Analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity

As per "Tool for the Demonstration and Assessment of Additionality", projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory frame-work, investment climate, access to technology, access to financing, etc. Although the tool does not consider the Sectoral Scope 1: Energy industries (renewable-/non -renewable sources) projects amongst the measures that can make use of the common practice guideline version 02, we preferred to utilise the same guideline to demonstrate that within the boundaries of the Yeşilırmak catchment (see Figure 5 for the borders of the differentiated geographical region) there are no similar projects that are developed and operational without the assistance of the VER revenue. According to the Guidelines on Common Practice (version 02), common practice analysis is presented through the following 4 steps.

Common Practice tool Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity:

As a hydropower project, the installed capacity is chosen as an appropriate proxy for "similar scale". The power generation capacity of 32.548 MW of the proposed project is selected as the design capacity. Therefore, the range from 16.274 to 48.82 MW is considered as applicable capacity.

Outcome of Step 1: Applicable output range is 16.274 MW to 48.82 MW.

Common Practice tool Step 2: identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

(a) The projects are located in the applicable geographical area;

(b) The projects apply the same measure as the proposed project activity;

,(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

The host country is geographically divided into 25 catchments as shown in the following figure . As can be seen from the figure the project site is located within the borders of the Yeşilırmak Catchment. Yeşilırmak and its major tributary Kelkit River constitute the Yeşilırmak River Catchment. Therefore we have considered the geographical boundary of our common practice analysis as the Yeşilırmak Catchment, and we have checked the hydropower plants that are operational, within the range defined in step 1 (16.274 MW to 48.82 MW) and located on the Kelkit or Yeşilırmak Rivers. These are listed on Table 7:

Figure 4. The 25 Water Catchments areas identified in Turkey.

Table 7: Power Plants that are operational on Yeşilırmak and Kelkit Rivers as of 11 April 2012 (as announced by the DSI as an answer to a question asked by a parliament member in the Turkish National Assembly).

Name of Facility	Ownership	Capacity	Province	DSI District	VER STATUS
Almus HPP	Government (EUAS)	27	Tokat	07 Samsun	
Koyulhisar HPP	Private	42	Sivas	07 Samsun	VCS 713
Çamligöze HPP	Government (EUAS)	32	Sivas	19 Sivas	
Kumköy HPP	Private	17.5	Samsun	07 Samsun	VCS 986
Niksar HPP	Private	40.2	Tokat	07 Samsun	VCS 1019
Reşadiye II HPP	Private	26.1	Tokat	07 Samsun	GS 644
Reşadiye III HPP	Private	22.3	Tokat	07 Samsun	GS 645

Tuna HPP	Private	37.2	Tokat	07 Samsun	VCS 668
Yavuz HPP	Private	22.5	Amasya	07 Samsun	

Outcome of Step 2:

There are 9 projects within the comparison range of the project activity.

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

The above list covers all the power plants within the geographical boundary defined above (as Yeşilırmak River Catchment). Checking all the power plants within the capacity range determined in Step 1, and looking projects that have started commercial operation before the start date of the project, and eliminating the ones that do claim VER credits, we end up with the following table:

Table 8: The list of hydroelectric power plants that are identified to be counted in the N_{all} list

Name of the Power Unit	Ownership	Capacity (MW)	Mean Production (GWh)	Firm Production (GWh)	Province	Town
Yavuz HES	Private	22.5	83.0	47.0	Amasya	Taşova
Çamligöze	Government	32	102.0	68.0	Sivas	Su Şehri
Almus Dam	Government	27	99.0	39.0	Tokat	Almus

Therefore, the number of Nall is 3.

Nall=3

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number Ndiff.

When we consider the project listed in Step 3, the projects differ from the project activity by the following aspects:

Çamlıgöze HPP and Almus Dam are developed by the government so they were developed in a different economic setting or with different motivations:

Yavuz HPP is a private owned project, that was developed by private sector, however the project activity was designed by DSI and was later auctioned and Masat Enerji Elektrik Üretim ve Tic. A.Ş. (Which is also the owner of the project activity that is subject to this Project Description Document) the present project owner won the auction. At the time the Yavuz HPP was developed the project owner was not aware of Carbon finance and the leverage it brings to their projects. On the other hand, we know by the project investment expenditure data filed by the same owner that, it is revealed that the unit cost (cost per MW)

of Yavuz has 68 % less than that of Midilli HPP therefore this project is also considered to be different than the project activity.

Outcome of Common Practice tool Step 4 is Ndiff=3

Common Practice tool Step 5: Step 5: calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

F=1-Ndiff/Nall

F=1-(3/3)

F=0

Conclusion of Common Practice tool version 2.0 (EB 69 Report Annex 8):

The proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3

Factor F is calculated to be 0 < 0.2.

And,

Nall-Ndiff =3-3=0< 3 in that case the Midilli HPP is not common practice.

Conclusion: In conclusion the proposed project is deemed to be additional according to ACM0002 and the tool and guideline for the demonstration and assessment of additionality.

3.6 Methodology Deviations

As it was also indicated in Section 2.6 of the validated Project Description Document V.2.00, dated 27 - June-2014, The UNFCCC methodology of ACM0002/ Version 14.0.0 and its related tools have been applied without any deviations.

With the exception of the below Monitoring parameter:

Data / Parameter	A_{PJ}
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.
Measured/Calculated/Default:	Indirectly measured based on the reservoir area map provided in Annex 5.
Source of Data:	Surface area determined using the lake surface area map provided in Annex-5 of this 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.
Frequency of monitoring/recording:	It is not going to be monitored as it is fixed and cannot alter.
Value Applied	26,000
Monitoring equipment	-
QA/QC procedures to be applied:	N/A
Calculation method:	N/A
Any comment:	-

The rational for this can be explained as follows:

Although the methodology (ACM0002, v.21.0.0) requires reservoir area to be monitored, since the power density of the project activity is very large, and the area flooded due to the project activity cannot exceed the above given amount (26,000 m^2; See also Appendix-3: The Map Showing the Reservoir Area of the Project Activity), the parameter related to the reservoir area is not going to be monitored during the crediting period for Midilli HPP Project.

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

For the current monitoring period, operation of the project activity has continued regularly during the monitoring period. However, in 2020, the project area received least precipitation of the last years and flow of the river has decreased dramatically. As a consequence of this event, electricity generation by the Midilli HPP was decreased significantly. Therefore, GHG emission reduction amount was also affected implicitly. Unfortunately, average annual precipitation amount of the area is decreasing every year when average annual temperature is increasing every year due to rapid climate change.

The key project implementation schedule from the beginning is given below.

Table 9: Project Implementation Schedule

Date (DD-Month-YYYY)	Activity
21-April--2006	Water usage agreement signed with DSI
07-December-2006	The Electricity Production License is granted activity
29-May-2007	Permits granted to set up construction work camp
15-August-2007	Investment Decision Date
31-January-2008	The EMRA decision for expropriation is issued
01-September-2008	Revised FSR Issued
12-June-2008	Turbine Contract Signed
23-June-2010	The New loan agreement is signed
15-June-2010	EIA Exemption certification issued
12-April-2012	Factory Calibration date of meters
09-December-2012	Grid connection agreement signed
27-December-2012	Commissioning date of the project
27-December-2012	Test of Meters prior to project commissioning
27-December-2012	Substantial Operation of Unit 2 & 4
27-December-2012	Start Date of the First Monitoring Period
10-July-2013	3rd unit discharge valve failed and caused flooding of the facility
30-September-2013	Unit 3 was activated for the first time after the flood
25-October-2013	Unit 2 activated for the first time after flood.

24-December-2013	Substantial Operation of Unit 1 & 3
24-December-2013	Unit number 1 and 3 acceptances was sustained.
30-June-2014	Final Validation Report
01-July-2014	Start Date of the Second Monitoring Period
30-June-2020	End Date of the Second Monitoring Period
01-July-2020	Start Date of the Third Monitoring Period
12-April-2022	End of Calibration validity
26-December-2022	End Date of the Third Monitoring Period
26-December-2022	End of the First Crediting Period
27-December-2022	Start Date of the Second Crediting Period

5 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

For the emission factors, that were used to calculate estimated emission reductions, publication of Turkish Ministry of Energy and Natural Resources, which is indicating Turkey's National Electric Grid Emission Factor for the year of 2020 was used. Publication includes calculated Emission Factor values that are Operating Margin (OM), Growth Based Margin (Build Margin-BM) and Combined Margin (CM) Emission Factors, for the relevant year with usage of the CDM's Clean Development Methodology Tool 07-V07.0. For this calculation, information regarding used data set is given below in detail:

- TEİAŞ Turkey's electricity generation-consumption and loss statistics,
- Common prepared report under Turkey's National Greenhouse Gas Inventory Reporting Format. - Common Reporting Format (CRF) tables for electricity generation (1.A.1.a.i) emission values
- Chronological order of power generation plants from TEİAŞ Load Dispatch Department with commissioning dates, plant names, fuel types, installed power values, electricity generation for the calculated year
- Checking off Volunteers from the websites of Gold Standard (GS) and Verified Carbon Standard (VCS) for the ownership status of the carbon reduction certificate and,
- From Clean Development Mechanism (CDM) Tool 009- V2.0, Power plant efficiency figures are used

According to this publication,

Operating Margin-OM; 0.7424 tCO_2/MWh[20]

Build Margin-BM; 0.3680 tCO_2/MWh[21]

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \textbf{(Equation-1)}$$

20 https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Bform2020.pdf

21 https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Bform2020.pdf

Where:

BE_y = Baseline emissions in year y (tCO_2/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 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 using the latest version of the "Tool to calculate the emission factor for an electricity system". (tCO_2/MWh).

The project activity is the installation of a new grid-connected renewable power plant so, EGbaseline=0

If the project activity is the installation of a Greenfield power plant, then:

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

Where:

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

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

Calculation of the Operating Margin Emission Factor

By using all of the data which were given above, Turkish Ministry of Energy and Natural Resources calculated $EF_{grid,OMsimple,y}$:

➔ **$EF_{grid,OMsimple,y} = 0.7424\ tCO_2/MWh$**

Calculation of the Build Margin Emission Factor

For BM factor calculation, Chronological order of power generation plants from TEİAŞ Load Dispatch Department with commissioning dates, plant names, fuel types, installed power values, electricity generation for the calculated year were used as input data. Consequently, Turkish Ministry of Energy and Natural Resources calculated EFgrid,BM,y.

➔ **$EF_{grid,BM,y} = 0.3680\ tCO_2/MWh$**

Calculating of the Combined Margin Emission Factor

Emission factor calculations have been corrected with the relevant weighted calculations as stipulated by the methodology for the second crediting period. According to "Tool to calculate the emission factor for an electricity system" (Version 07), Article 86 clause (b), calculation of the combined margin for

renewable energy projects (except wind and solar) second crediting period, the following values need to be used for wOM and wBM.

"All other projects [...] wOM = 0.25 and wBM = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool."

The data used to calculate the combined margin for the year 2020 were published by Turkey's Energy and Natural Resources Ministry. The data -which includes build margin and operating margin factors - have been obtained from the ministry's most recent factsheet. This document contains the latest available data in the country and is issued by the highest authority to make such calculations and determine the factors.

➔ $EF_{grid,CM,y} = 0.25*0.7424 + 0.75*0.3680 = 0.4616\ tCO_2/MWh$

Then:

$ER_y = BE_y - PE_y = EG_{facility,y} * EF_{grid,CM,y} = 124{,}050\ MWh/year * 0.4616\ tCO_2/MWh = 57{,}261\ tCO_2/year$

Baseline scenario is identified and described in this section. Emission reductions due to project activity is calculated according to "Tool to calculate the emission factor for an electricity system" (Tool 07) version 07.0.

A brief explanation of this methodology is given in Tool as:

This methodological tool determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "combined margin" emission factor (CM) of the electricity system.

5.2 Project Emissions

The proposed project activity involves the generation of electricity by development of a hydro power plant. Midilli HPP has 26,000 m^2 reservoir area and 32,548,000 W capacity. Its density is calculated as 1,251.85 W/m^2 which is above 10 W/m^2 threshold. The generation of electricity does not result in greenhouse gas emissions and therefore is taken as 0 tCO_2/year.

5.3 Leakage

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

Then: $ER_y = BE_y$

5.4 Estimated Net GHG Emission Reductions and Removals

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
27-December-2022 – 31-December-2022	784	0	0	784
2023	57,261	0	0	57,261
2024	57,418	0	0	57,418
2025	57,261	0	0	57,261
2026	57,261	0	0	57,261
2027	57,261	0	0	57,261
2028	57,418	0	0	57,418
2029	57,261	0	0	57,261
2030	57,261	0	0	57,261
2031	57,261	0	0	57,261
01-January-2032 – 26-December-2032	56,633	0	0	56,633
Total	**573,080**	**0**	**0**	**573,080**

6 MONITORING

6.1 Data and Parameters Available at Validation

Data / Parameter	**$EF_{grid,BM,y}$**
Data unit	tCO_2/MWh
Description	For the emission BM factor, that were used to calculate estimated emission reductions, publication of Turkish Ministry of Energy and Natural Resources which is indicating Turkey's National Electric Grid Emission Factor for the year of 2019 was used. Publication includes calculated Emission Factor values that are Operating Margin (OM), Growth Based Margin (Build Margin-BM) and Combined Margin (CM) Emission Factors, for the relevant year with usage of the CDM's Clean Development Methodology Tool 07-V07.0.
Source of data	Please see: https://enerji.gov.tr/evced-cevre-ve-iklim-turkiye-ulusal-elektrik-sebekesi-emisyon-faktoru
Value applied:	0.3680
Justification of choice of data or description of measurement methods and procedures applied	Ministry of Energy and Natural Resources makes available the official data in Turkey. The latest data available during this document preparation was for 2020. Please see section 4.1 for further description of measurement methods.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	**$EF_{grid,OM,y}$**
Data unit	tCO_2/MWh
Description	For the combined margin CO_2 emission factor that were used to calculate estimated emission reductions, publication of Turkish Ministry of Energy and Natural Resources which is indicating Turkey's National Electric Grid Emission Factor for the year of 2020 was used.

Source of data	Please see: https://enerji.gov.tr/evced-cevre-ve-iklim-turkiye-ulusal-elektrik-sebekesi-emisyon-faktoru
Value applied:	0.7424
Justification of choice of data or description of measurement methods and procedures applied	The baseline emissions are the product of electrical energy baseline expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor. Please see section 4.1 for further description of measurement methods.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	For the combined margin CO_2 emission factor that were used to calculate estimated emission reductions, publication of Turkish Ministry of Energy and Natural Resources which is indicating Turkey's National Electric Grid Emission Factor for the year of 2020 was used.
Source of data	Please see: https://enerji.gov.tr/evced-cevre-ve-iklim-turkiye-ulusal-elektrik-sebekesi-emisyon-faktoru
Value applied:	0.4616 (this value will be used for second crediting period)
Justification of choice of data or description of measurement methods and procedures applied	The baseline emissions are the product of electrical energy baseline expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor. Please see section 4.1 for further description of measurement methods.
Purpose of Data	Calculation of baseline emissions
Comments	-

6.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	The data from the Electricity Meters are the basis for the settlement notification of EPIAS. Data are gathered electronically from the meters by TEIAS and stored in secured website of EPIAS, which is accessible to project developer with a private password. For monitoring, the monthly settlement notification of EPIAS shall be used as source of data.
Description of measurement methods and procedures applied	Regarding the electricity meters: two meters are placed (one main and one reserve) at the TEIAS substation. These meters are sealed by TEIAS and intervention by project proponent is not possible. The fact that two meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is in the interest of not only the emission reduction monitoring, but also paramount for the business relation between the plant operator and the electricity buyers.
Frequency of monitoring/recording	Continuous monitoring, hourly measurement, and at least monthly recording
Value applied:	**124,050 MWh/year**
Monitoring equipment	Calibration frequency: According to the Article 9 of the relevant regulation, periodical inspections of "gauges for electric, water, coal gas, natural gas and, current and voltage measuring transformers will be made once in 10 years". This is in line with the monitoring plan and national requirements. TEIAS will decide when to carry out the next calibration. The Project owner has no control over or access to the measurement devices and is not entitled to perform any type of maintenance or calibration. The specification of the previous meters is provided below:

Name	Serial Number	Brand - Model	Accuracy Class
Main Meter-1	0464220	ELSTER A 1500	0.5s
Back-up meter-1	0464222	ELSTER A 1500	0.5s

Main Meter-2	0464221	ELSTER A 1500	0.5s
Back-up meter-2	0464223	ELSTER A 1500	0.5s

First protocol date is 27-December-2012 for previous meters.

On 21-July-2022, the meters have been changed in line with the Article 9 of the 'Regulation of Metering and Testing of Metering Systems'[22]. Changing protocol has been provided.

The specification of new (current) meters is provided below:

Name	Serial Number	Brand - Model	Accuracy Class
Main Meter-1	11590336	EMH-LZQ-XC	0.5
Back-up meter-1	11590338	EMH-LZQ-XC	0.5
Main Meter-2	11590337	EMH-LZQ-XC	0.5
Back-up meter-2	11590339	EMH-LZQ-XC	0.5

QA/QC procedures applied

According to the Article 2 of the 'Communiqué Regarding the Meters to be used in the Electricity Market '[23] (Communiqué): '*The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained* ***"Type and System Approval" certificate from the Ministry of Trade and Industry.'*** Therefore, Ministry of Trade and Industry (Ministry) is responsible from control and calibration of the meters.

Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems'[24] (Regulation) of Ministry states that: ' *b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done* ***every 10 years****.'* Therefore, periodic calibration of the meters will be done every 10 years.

Also, according to Article 67 (page 20) of this regulation, the calibration shall be done in calibration stations which have been tested and approved by Ministry of Trade and Industry. Article 10-d) of Communiqué requires the meters shall be three-phase four wire and

[22] Please see, http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch=
[23] Please see, https://www.epdk.gov.tr/Detay/DownloadDocument?id=+6B2PMv4N4A=
[24] Please see, http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch=

	Article 64 of Regulation clearly states how calibration shall be performed for this kind of meters. As above mentioned, the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan. EPİAŞ data is used as a main source, and cross-check is done by using the TEİAŞ receipts.
Purpose of data	To exhibit renewable electricity generation performance the plant.
Calculation method	Regarding the electricity meters: four meters are placed (two main and two reserve) at the Midilli HPP which meters the electricity transferred to TEİAŞ substation. These meters are sealed by TEIAS and intervention by project proponent is not possible. The fact that four meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is not only in the interest of the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyers. Measured hourly and readings monthly. Monthly settlement notifications of EPİAŞ consist hourly electricity production and withdrawn from the grid. Since the meters are reading electricity supplied to the system and withdrawn from the system separately, the net electricity amount supplied to the grid is calculated by electricity supplied minus electricity withdrawn which is be taken from monthly settlement notifications. Thus, with this procedure is monitored sufficient and no extra Monitoring has to be implemented.
Comments	-

6.3 Monitoring Plan

As described above, the only relevant data that has to be monitored is the net electricity generation ($EG_{facility,y}$) per year at the end of one monitoring period, the data from the monthly meter reading records by PMUM. In approved PD, PMUM records were given as reference for electricity generation. However, the name of this institution was changed, and electricity generation records have been belonged to EPİAŞ. Therefore, EPİAŞ records will be added up to the yearly electricity generation and multiplied with the combined margin emission factor with the help of an excel spreadsheet that also contains the combined margin calculation. Thus, the complete baseline approach is always transparent and traceable. If monitoring period ends an intermediate date (ie 13th March), the ratio of days included in monitoring

period to whole days in that month will be multiplied by electricity generation in that month (ie 13/31 x EG_{March}).

The monthly meter reading documents[25] (settlement notifications of EPIAS) are stored by 'Masat Enerji' and TEIAS. The settlement notification, which is issued by TEIAS and includes the meter reading data, is stored on a TEIAS file server and accessible for 'Masat Enerji' via a secured website. The meters themselves can always be read as plausibility check for verification. With this, no additional structures or processes have to be implemented to insure the availability and high quality of the necessary data for monitoring. The electrical single line diagram is shown in Figure 5.

On the other hand, Masat Enerji has its own unofficial meters to make sure that the generations are correct. This meter is not the basis of invoicing and only for internal use.

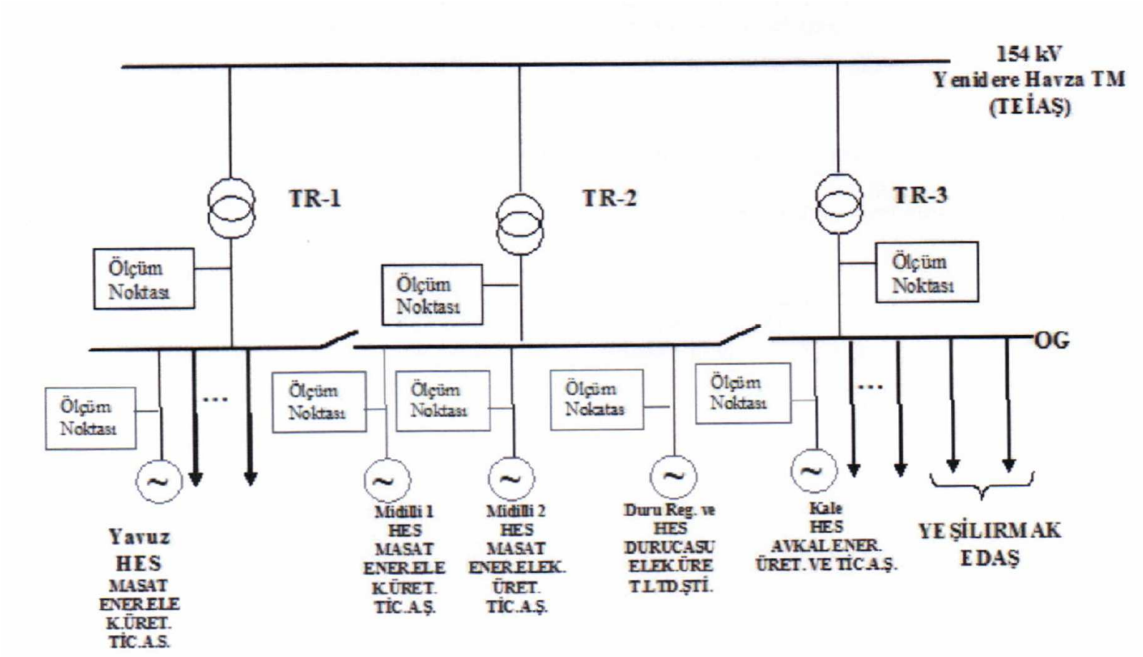

Figure 5. Single Line Diagram of Midilli HPP

Moreover, technicians in Midilli HPP daily reads meters and keeps record for electricity generation amount and reports to management. These records can be used for monitoring in case of any problem will arise in meters.

- Currently 14 people are working in the plant.
- All data monitored under the monitoring plan will be kept in electronic form and hard copy for 2 years after the end of the crediting period.

[25] For this monitoring period, approved receipts showing the electricity production agreed upon by TEIAS and the project owner were used to check electricity production with EPİAŞ records.

7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

<table>
<tr><td>Data / Parameter</td><td>$EG_{PP\text{-}Gross\ Generation,\ y}$</td></tr>
<tr><td>Data unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Quantity of electricity exported by the power plant to Grid for self-consumption, in year y</td></tr>
<tr><td>Value applied:</td><td>94,672.86 MWh (for this monitoring period)
<table>
<tr><th colspan="2">Vintage</th><th>Electricity supplied to the grid (MWh)</th></tr>
<tr><td>01-June-2020</td><td>31-December-2020</td><td>25,699.95</td></tr>
<tr><td>01-January-2021</td><td>31-December-2021</td><td>19,144.49</td></tr>
<tr><td>01-January-2022</td><td>26-December-2022</td><td>49,825.42</td></tr>
<tr><td colspan="2">Total</td><td>94,672.86</td></tr>
</table></td></tr>
<tr><td>Comments</td><td>The specification of the previous meters is provided below:
<table>
<tr><th>Name</th><th>Serial Number</th><th>Brand - Model</th><th>Accuracy Class</th></tr>
<tr><td>Main Meter-1</td><td>0464220</td><td>ELSTER A 1500</td><td>0.5s</td></tr>
<tr><td>Back-up Meter-1</td><td>0464222</td><td>ELSTER A 1500</td><td>0.5s</td></tr>
<tr><td>Main Meter-2</td><td>0464221</td><td>ELSTER A 1500</td><td>0.5s</td></tr>
<tr><td>Back-up Meter-2</td><td>0464223</td><td>ELSTER A 1500</td><td>0.5s</td></tr>
</table>
First protocol date is 27-December-.2012 for previous meters.

On 21-July-2022, the meters have been changed in line with the Article 9 of the 'Regulation of Metering and Testing of Metering Systems'[26]. Changing protocol has been provided.

The specification of new (current) meters is provided below:
<table>
<tr><th>Name</th><th>Serial Number</th><th>Brand - Model</th><th>Accuracy Class</th></tr>
</table></td></tr>
</table>

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

Main Meter-1	11590336	EMH-LZQ-XC	0.5
Back-up Meter-1	11590338	EMH-LZQ-XC	0.5
Main Meter-2	11590337	EMH-LZQ-XC	0.5
Back-up Meter-2	11590339	EMH-LZQ-XC	0.5

Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems' (Regulation) of Ministry states that: ' b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years.' Therefore, periodic calibration of the meters will be done every 10 years. The Project owner has no control over or access to the measurement devices and is not entitled to perform any type of maintenance or calibration.

Data / Parameter	$EG_{PP\text{-}self\ consumption,\ y}$
Data unit	MWh
Description	Quantity of electricity imported by the power plant to Grid for self-consumption, in year y
Value applied:	**1.91 MWh (for this monitoring period)**

Vintage		Electricity consumption from the grid (MWh)
01-June-2020	31-December-2020	0.90
01-January-2021	31-December-2021	0.74
01-January-2022	27-December-2022	0.27
Total		**1.91**

Comments

The specification of the previous meters is provided below:

Name	Serial Number	Brand - Model	Accuracy Class
Main Meter-1	0464220	ELSTER A 1500	0.5s
Back-up Meter-1	0464222	ELSTER A 1500	0.5s
Main Meter-2	0464221	ELSTER A 1500	0.5s

Back-up Meter-2	0464223	ELSTER A 1500	0.5s

First protocol date is 27-December-.2012 for previous meters.

On 21-July-2022, the meters have been changed in line with the Article 9 of the 'Regulation of Metering and Testing of Metering Systems'[27]. Changing protocol has been provided.

The specification of new (current) meters is provided below:

Name	Serial Number	Brand - Model	Accuracy Class
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Main Meter-2	11590337	EMH-LZQ-XC	0.5
Back-up Meter-2	11590339	EMH-LZQ-XC	0.5

Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems' (Regulation) of Ministry states that: ' b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years.' Therefore, periodic calibration of the meters will be done every 10 years. The Project owner has no control over or access to the measurement devices and is not entitled to perform any type of maintenance or calibration.

Data / Parameter	Cap_{PJ}
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Value applied:	32,550,000 W (32.55 MW)
Comments	From the starting of the project activity, turbines remained same, so the capacity remained same.

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

7.2 Baseline Emissions

Used Formulas:

The total emission reductions can be calculated with the results of the below described equations. The emission reduction is equal to the baseline emissions minus project emissions and leakage emissions. Leakage emissions in this project are negligible. There are no project emissions in this kind of project. The general equation is as follows:

Emission reductions

Baseline emissions are calculated as per ACM0002 Version 21 formula 1:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \textbf{(Equation-2)}$$

Where:

BE_y : Baseline emissions in year y (tCO_2/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 of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$: Combined margin CO_2 emission factor for grid connected power generation in year y and validated value = 0.5140016 tCO_2/MWh.

Because the Project is a greenfield renewable energy power plant;

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

Emission reductions achieved by the project activity are calculated as per formula 2 of ACM0002.:

$$ER_y = BE_y - PE_y \quad \textbf{(Equation-3)}$$

Where:

ER_y : Emission reductions in year y (tCO_2/yr).

BE_y : Baseline emissions in year y (tCO_2/yr).

PE_y : Project emissions in year y (tCO_2/yr); validated value = 0.

$EG_{facility,y} = EG_{PP\text{-}Gross\ Generation,\ y} - EG_{PP\text{-}self\ consumption,\ y} = 94{,}672.86\ MWh - 1.91\ MWh = 94{,}670.95\ MWh$

$BEy = EG_{facility,y} * EF_{grid,CM,y} = 94{,}670.95\ MWh * 0.5140016\ tCO_2/MWh = 48{,}647\ tCO_2$ (Round-downed)

0.5140016 tCO_2/MWh is the emission factor of the first crediting period. Since this monitoring period belongs to the first crediting period, this emission factor is used in this section when calculation of emission reduction.

7.3 Project Emissions

There are no project emissions in this kind of project. Midilli HPP has 26,000 m^2 reservoir area and 32,548,000 W capacity. Its density is calculated as 1251,85 W/m^2 which is above 10 W/m^2 threshold.

7.4 Leakage

No leakage needs to be considered.

7.5 Net GHG Emission Reductions and Removals

Emission reductions achieved by the project activity are calculated as per formula of ACM0002 Version 14: $ER_y = BE_y - PE_y$

Where:

ER_y : Emission reductions in year y (tCO_2/yr).

BE_y : Baseline emissions in year y (tCO_2/yr).

PE_y : Project emissions in year y (tCO_2/yr); validated value = 0.

$$BEy = EG_{facility,y} * EF_{grid,CM,y} \quad \textbf{(Equation-4)}$$

With an actual annual project electricity generation of amounts which was given in the Appendix 1 of this report, and $EF_{grid,CM,y}$ given as 0.5140016 tCO_2/MWh[28] , net GHG emission reductions/removals are:

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
01-July-2020 – 31-December 2020	13,207	0.00	0.00	13,207
01-January-2021 – 31-December 2021	9,835	0.00	0.00	9,835
01-January-2022 – 26-December 2022	25,605	0.00	0.00	25,605
Total	**48,647**	**0.00**	**0.00**	**48,647**

[28] 0.5140016 tCO_2/MWh is the emission factor of the first crediting period. Since this monitoring period belongs to the first crediting period, this emission factor is used in this section when calculation of emission reduction.

Comparison of ex-ante emission reductions and actual emission reduction is given in the table below.

Ex-ante emissions reductions/removals	Achieved emissions reductions/removals	Percent difference	Justification for the difference
158,791	48,647	-69.36 %	Electricity generated and supplied to grid is depended to external conditions like flow rate and precipitation amount. In 2020, the area has received least precipitation of the last ten years, so that year electricity generation in 2021 is much lesser than estimated amount. Apart from this, electricity generation of the project is not reaching estimated generation since estimation was performed by processing past data (i.e flow of river), but past data is not reflecting actual situation due to rapid climate change. As a result, difference on the carbon reductions is not resulted from project owner but external conditions.

APPENDIX 1: MONTHLY ELECTRICITY GENERATION DATA

Months	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
Jul-20	2,145	0	0	2,145
Aug-20	2,537	0	0	2,537
Sep-20	2,634	0	0	2,634
Oct-20	2,653	0	0	2,653
Nov-20	2,489	0	0	2,489
Dec-20	749	0	0	749
Sum 2020	13,207	0	0	13,207
Jan-21	689	0	0	689
Feb-21	560	0	0	560
Mar-21	1,160	0	0	1,160
Apr-21	1,354	0	0	1,354
May-21	729	0	0	729
Jun-21	845	0	0	845
Jul-21	626	0	0	626
Aug-21	964	0	0	964
Sep-21	835	0	0	835
Oct-21	642	0	0	642
Nov-21	667	0	0	667
Dec-21	764	0	0	764
Sum 2021	9,835	0	0	9,835
Jan-22	817	0	0	817
Feb-22	2,076	0	0	2,076
Mar-22	4,778	0	0	4,778
Apr-22	4,822	0	0	4,822
May-22	2,555	0	0	2,555
Jun-22	2,570	0	0	2,570
Jul-22	1,299	0	0	1,299
Aug-22	1,450	0	0	1,450
Sep-22	1,724	0	0	1,724
Oct-22	1,658	0	0	1,658
Nov-22	964	0	0	964
Dec-22	892	0	0	892
Sum 2022	25,605	0	0	25,605
Total Sum	***48,647***	0	0	***48,647***

APPENDIX 2: SUPPORTING EVIDENCE FOR SDGS

Row 1- SDG13: Air Quality

Current Project Contributions/ Contributions Over Project Lifetime: The project's emissions reduction has been verified as 48,647 tCO_2e during the latest monitoring period. Please visit the fourth Monitoring Report. Amount of emission reduction over project lifetime has been calculated by sum of the emission reductions in the previous monitoring periods.

Monitoring Period #	tons CO_2
1st Verification	31,320
2nd Verification	183,208
3rd Verification	**48,647**
Total	**263,175**

Row 2- SDG7: Renewable energy share in the total final energy consumption

Current Project Contributions/ Contributions Over Project Lifetime: The project's net renewable electricity generation has been verified as 94,672.86 MWh during the latest monitoring period. Please visit fourth Monitoring Report. Amount of net electricity generation over project lifetime has been calculated by sum of the generation in the previous monitoring periods.

Monitoring Period #	MWh
1st Verification	60,934.34
2nd Verification	356,441.82
3rd Verification	**94,672.86**
Total	**512,044.11**

APPENDIX 3: RESERVOIR AREA