International Carbon Registry

Aşağı Kaleköy HPP

ACM0002 - Grid-connected electricity generation from renewable sources - Version 21.0

Abstract

Aşağı Kaleköy HPP is situated in Genç District of Bingöl Province, Türkiye and has been established and operated by Kalehan Genç Enerji Üretim A.Ş. Installed capacity of the power plant is 510.2 MW_m / 500 MW_e and annual generation is expected to be 1,193,170 MWh according to the generation license.

KALEHAN ENERJİ

Kalehan Genç Enerji Üretim A.Ş.

Project design description (PDD)

Basic Information	
ID of project	258
Project name	Aşağı Kaleköy HPP
Project proponent	Kalehan Genç Enerji Üretim A.Ş.
Representative	Kağan Pehlivan Consultant Profed Enerji Dan. San. ve Tic. Ltd. Şti. kagan.pehlivan@profed.com.tr +90 506 275 34 93
Statement by the project proponent	The Kalehan Genç Enerji Üretim A.Ş. states that they are responsible for the preparation and fair presentation of this PDD and all accompanying documentation provided
Pre-registration date	29/12/2023
Version number of the PDD	1.5
Date of version	16/04/2025
Methodology(ies) applied and version number	☐ No ☒ Yes, ACM0002: Grid-connected electricity generation from renewable sources - Version 21.0
Criteria for validation	☐ ICR requirement document v.4 ☒ ICR requirement document v.5 ☒ ISO 14064-2 ☒ Applied methodology, ACM0002: Grid-connected electricity generation from renewable sources - Version 21.0 ☐ Other
Host country(ies)	Türkiye
Host country approval	☐ Yes ☒ No
Sectoral scope of project activity	Scope 1 - Energy industries (renewable - / non-renewable sources)
Multiple project activities	☐ Yes ☒ No
Methodology(ies) applied and version number	ACM0002: Grid-connected electricity generation from renewable sources - Version 21.0
Type (CDR, avoidance, hybrid)	☐ CDR ☒ Avoidance ☐ Hybrid
MRV cycle:	Once for generation up to first verification, every 2 years thereafter.
Estimated annual average GHG emission mitigation (t CO2-e)	662,447

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1. Project description

1.1 Purpose, objectives, and general description of the project

Aşağı Kaleköy Hydro Power Plant has been established and operated by Kalehan Genç Enerji Üretim A.Ş. The purpose of establishing the power plant is to contribute to Turkey's increasing energy demand by providing clean energy to the Turkish National Grid from hydro power and to provide competitive advantage to local industries by providing cheap energy. By implementing this project, investors also aim to reduce the dependency of fossil fuels by generating clean energy.

The project is a greenfield power plant; the project activity is the installation of a new grid-connected renewable power plant; no renewable power plant was implemented/operated before the implementation of the project activity. The project is connected to the National Grid by 380 kV Batman-2 Transformer Center. The water resource for Aşağı Kaleköy HPP is the Murat River. The region where the power plant is located has a continental climate. This climate, characterized by particularly rainy winters, provides an advantage in terms of ensuring the water supply necessary for the electricity the plant will generate. The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system.

The project area included agricultural, forest and private lands before the power plant. For lands with forest land characteristics, the necessary permits were obtained from the relevant Forest Regional Directorate of the Ministry of Forestry and Water Affairs of the Republic of Turkey in accordance with Article 17 of the Forest Law No. 6831. For lands with agricultural land characteristics, the Soil Protection and Land Use Law No. 5403, Pasture Law No. 4342 and Fisheries Law No. 1380 were complied with, and permits within this scope were obtained from the relevant ministries and regional directorates. For private lands, private lands open to expropriation were expropriated by the Energy Market Regulatory Authority in accordance with the “Expropriation Law” No. 2942. All kinds of damages and losses during expropriation procedures were covered by the project owner.

In the baseline scenario, the electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants. Since Türkiye’s grid mainly consists of thermal power plants, this would have resulted in GHG emissions. However, in the project scenario, the project whose characteristics are summarized below will generate electricity from hydro power and will result in emission reductions in parallel with its electricity generation.

The project activity will generate greenhouse gases (GHG) emission reductions by avoiding usage of fossil fuels. The annual emission reduction estimated for this project is 662,447 tCO2e. During the crediting period, 6,624,470 tCO2e are expected to be reduced.

The generation license of the project was issued on 21/05/2014 for 42 years, 3 months, 16 days. The project consists of four units, with three having an installed capacity of 158.66 MWm / 155.49 MWe each, and the fourth having an installed capacity of 34.22 MWm / 33.53 MWe. The total installed capacity of the power plant is therefore 510.2 MWm / 500 MWe, and annual generation is expected to be 1,193,170 MWh according to the generation license.

The project is operational since 12/03/2020, which is the commissioning date of unit 4. The project complies with the relevant regulations and laws in Turkey. In line with Turkish environmental regulations, an “Environmental Impact Assessment (EIA) Approval Letter” was approved by the Ministry of Environment and Urbanization in 07/09/2016.

The project will produce positive environmental and economic benefits through the following aspects:
• Displacing the electricity generated by fossil fuel fired power plants by utilizing the renewable resources so as to avoid environmental pollution and GHG emissions,
• Help to stimulate the growth of the renewable energy industry in Türkiye,
• Contributing the economic development of the region by providing sustainable energy resources,
• Increasing the income and local standard of living by providing job opportunities for the local people

1.2 Project type and sectoral scope

Sectoral scope	#1 – Energy (renewable/nonrenewable sources)
Project type	Avoidance / Reduction

1.3 Project

☒ Single location/area or installation
☐ Bundled project (multiple locations/areas or installations)
☐ Grouped project (locations/areas or installations added post validation)
☐ Bundled and grouped project.

1.3.1 Eligibility criteria for grouped project

Not applicable since Aşağı Kaleköy HPP is not a grouped project.

1.4 Location

The project is located in Genç District of Bingöl Province, Türkiye.

Address	Project is located in Murat River in Genç District of Bingöl Province in Türkiye
County/province	Bingöl
Country	Türkiye
Region	Eastern Anatolia Region
Geographic location	
Latitude	38°49'49.03"N / 38.8302° N
Longitude	40°42'23.77"E / 40.7066° E
Map link	https://maps.app.goo.gl/rPzE3wRjQq8jYSwu5

Figure 1. Location of Aşağı Kaleköy HPP

1.5 Conditions prior to implementation

The project is a greenfield power plant; the project activity is the installation of a new grid-connected renewable power plant; no renewable power plant was implemented/operated before the implementation of the project activity. The project is connected to the National Grid by 380 kV Batman-2 Transformer Center. The water resource for Aşağı Kaleköy HPP is the Murat River. The region where the power plant is located has a continental climate. This climate, characterized by particularly rainy winters, provides an advantage in terms of ensuring the water supply necessary for the electricity the plant will generate.

The project area included agricultural, forest and private lands before the power plant. For lands with forest land characteristics, the necessary permits were obtained from the relevant Forest Regional Directorate of the Ministry of Forestry and Water Affairs of the Republic of Turkey in accordance with Article 17 of the Forest Law No. 6831. For lands with agricultural land characteristics, the Soil Protection and Land Use Law No. 5403, Pasture Law No. 4342 and Fisheries Law No. 1380 were complied with, and permits within this scope were obtained from the relevant ministries and regional directorates. For private lands, private lands open to expropriation were expropriated by the Energy Market Regulatory Authority in accordance with the "Expropriation Law" No. 2942. All kinds of damages and losses during expropriation procedures were covered by the project owner.

Figure 2. Location of the project activity before implementation, 2011

1.6 Technology applied

Aşağı Kaleköy Hydro Power Plant is a greenfield reservoir type hydroelectric power plant and uses potential energy of water to generate electricity to transmit to the National grid. The project is connected to the National Grid by 380 kV Batman-2 Transformer Center. The water resource for Aşağı Kaleköy HPP is the Murat River. The region where the power plant is located has a continental climate. This climate, characterized by particularly rainy winters, provides an advantage in terms of ensuring the water supply necessary for the electricity the plant will generate.

The power plant consists of the facilities listed below:

- 4 radial gate spillways
- 4 hydraulic turbines
- Three-phase synchronous generators
- Powerhouse including 3 turbines with 158.66 MWm / 155.49 MWe each and 1 turbine with 34.22 MWm / 33.53 MWe capacity

TURBINES		
Unit No	Unit 1 – Unit 2 – Unit 3	Unit 4
Production Company	GE	VOITH
Type	Francis Hydro	Francis Hydro
Installed Capacity (1 Unit)	158.66 MW	34.22 MW
Hydraulic Head	89.6 m	89.67 m
Hydraulic Capacity (1 Unit)	190 m^3/sec	41,23 m^3/sec
Rated Speed	166.67 rpm	375 rpm
Average Lifetime[1]	150,000 hours	150,000 hours

[1] Average lifetime of hydro turbines, TOOL 10 v01

GENERATORS		
Unit No	Unit 1 – Unit 2 – Unit 3	Unit 4
Production Company	ANDRITZ	VOITH
Rated Power	186000 kVA	40000 kVA
Rated Current	7457.4 A	1604 A
Rated Voltage	14400 V	14400 V
Rated Frequancy	50 Hz	50 Hz
Rated Speed	166.67 rpm	375 rpm
Average Lifetime[2]	25 years	25 years
TRANSFORMERS		
Unit No	Unit 1 – Unit 2 – Unit 3	Unit 4
Production Company	GE	GE
Nominal Power	165/190 MVA	35/40 MVA
Cooling Type	ONAN/ONAF	ONAN/ONAF
Frequency	3/50 Hz	3/50 Hz
Average Lifetime[3]	30 years	30 years

Each unit in the power plant has one main meter and one backup meter located in site area for monitoring the electricity generated by the power plant. Readings are made through the main meter, while the backup meter is used for crosscheck. Technical specifications and serial numbers of the meters are presented in the table below:

Meter	Type	Accuracy	Serial Number	Last Calibration Date
Unit 1 – Main Meter	EMH-LZQJ-XC	0.5S	7019894	28/11/2022
Unit 1 – Backup Meter	EMH-LZQJ-XC	0.5S	7019895	28/11/2022
Unit 2 – Main Meter	EMH-LZQJ-XC	0.5S	7019896	28/11/2022
Unit 2 – Backup Meter	EMH-LZQJ-XC	0.5S	7019897	28/11/2022
Unit 3 – Main Meter	EMH-LZQJ-XC	0.5S	7019898	28/11/2022
Unit 3 – Backup Meter	EMH-LZQJ-XC	0.5S	7019899	28/11/2022
Unit 4 – Main Meter	EMH-LZQJ-XC	0.5S	7019900	28/11/2022
Unit 4 – Backup Meter	EMH-LZQJ-XC	0.5S	7019901	28/11/2022

[2] Average lifetime of air-cooled electricity generators, TOOL 10 v01
[3] Average lifetime of transformers, TOOL 10 v01

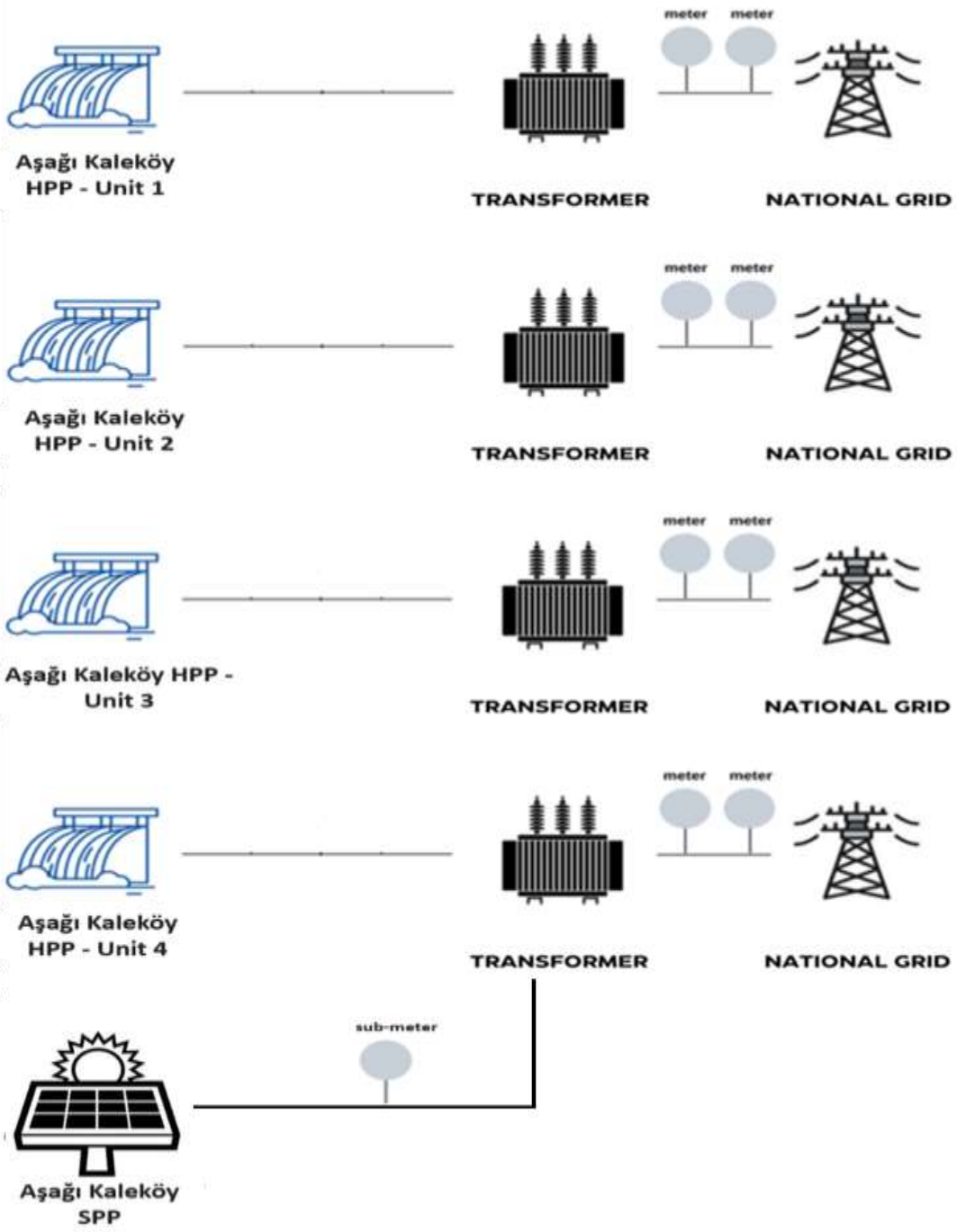

Figure 3. Diagramatic Representation of the Project

Plant Load Factor of the project

According to EB 48 Annex 11; the plant load factor shall be defined ex-ante according to one of the following options:

(a) The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval;

(b) The plant load factor determined by a third party contracted by the project participants.

Since the data used in the PLF calculation are the data taken from the generation license prepared by the government, option (a) is chosen. According to the generation license, the total annual generation of the power plants is 1,193,170 MWh. Using this value, the PLF is as follows:

PLF = (Annual Generation / 365 days) / (Installed Power x 24 hours)
= (1,193,170 MWh / 365 days) / (500 MW * 24 hours)
= 3,269 / 12,000 = 27.2%

1.7 Roles and responsibilities

1.7.1 Project proponent(s)

Organization Name	Kalehan Genç Enerji Üretim A.Ş.
Role in the project	Project Proponent
Contact person	Mahmut Yılmaz
Title	Technical Office Engineer
Address	ATG Binası Celal Bayar Bulvarı No:78/225 06570 ANKARA / TÜRKİYE
Telephone	+90 312 467 54 19
Email	myilmaz@kalehan.com.tr

1.7.2 Others involved in the project

Organization name	Profed Enerji Çevre Dan. San. ve Tic. Ltd. Şti.
Role in the project	Project Representative
Contact person	Kağan Pehlivan
Title	Project Coordinator
Address	Esentepe Mah. Mithat Ünlü Sok. Propaganda Plus Residence 26/26 Şişli/İstanbul
Telephone	+90 506 275 34 93
Email	kagan.pehlivan@profed.com.tr

1.8 Chronological plan/implementation

1. Project Start Date: 12/03/2020
2. Baseline Period: 12/03/2020 – 11/03/2030
3. End of the Crediting Period: 11/03/2030
4. Frequency of Monitoring and Reporting: Every 2 years after the first report

5. Crediting Period: 10 years
6. Validation and Verification Activities: In less than 1 year period after the submission.

Table 1. Milestones of the project

Date	Milestone
21/05/2014	Generation License
October 2015	Feasibility Report
10/03/2016	Investment Decision Date (Board Decision)
11/04/2016	Energy Transmission Line Survey Project Contract – First agreement after the investment decision date
07/09/2016	EIA Approval
04/05/2017	Forestry Permit
12/03/2020	Commissioning Date of Unit 4
15/05/2020	Commissioning Date of Unit 1
19/11/2020	Commissioning Date of Unit 3
17/12/2020	Commissioning Date of Unit 2 – Full Development

1.9 Eligibility

The project activity meets the eligibility criteria as per Section 3.3, 3.4.2 and 3.8 of ICR Requirement Document, v5.0[4] . The project activity leads to mitigation of climate change by generating and supplying clean and renewable electricity to the grid.

As per para 2 of Section 3.3 of mentioned document, "All projects with a start date after 01/01/2013 are eligible for registration with ICR.". Since the project start date is 12/03/2020, the project is eligible for this criteria.

As per para 3 of Section 3.3 of mentioned document, "Projects with a start date before 01/01/2020 shall pre-register the project, have signed a contract with an approved VVB for validation/verification, and start the validation process before 31/12/2023". Since the project's start date is 12/03/2020, this condition is not applicable for this project.

As per Section 3.4.2 of the mentioned document, "Crediting period for project activities is a conservative estimate of the technical lifetime of the installed technologies or implemented measures and associated impacts with a maximum of 10 years with no option of renewing the crediting period.". Since the project's crediting period is determined as 10 years with no renewal, the project is eligible for this criteria.

As per Section 3.8 of the mentioned document:

1. "Projects registered with ICR shall not issue instruments for the same GHG emission mitigations with another GHG program or scheme, e.g. renewable energy certificates": The project does and will not issue GHG instruments with another GHG program or scheme.
2. "Projects registered with other GHG programs may apply for transfer registration to ICR or be jointly registered. When registering with ICR, all previous documentation regarding the project activities shall be made available for ICR and the VVB and the project shall complete a gap validation. The project shall not issue ICCs for the same monitoring period as issued in the corresponding GHG program or scheme. The ICR process requirements discuss requirements for transitioning from other GHG programs": The project has not been registered with other GHG programs.
3. "If the project boundary overlaps with a project of a similar nature registered with the ICR program or another GHG program, the project proponent shall demonstrate that there is no double counting of

[4] https://documentation.carbonregistry.com/documentation/icr-program/criteria

impacts.": The project boundary defined as "the project power plant and all power plants connected physically to the electricity system". As the project boundary includes the project power plant, no overlap with another project is expected.

4. "The project proponent shall not account for any GHG emission mitigations resulting for the project activities for any ICCs retired by another organization for their own GHG reporting. The project proponent shall report the baseline emissions, but may report separately on any instruments issued from the project activities. If the project proponent wants to report publicly actual GHG emissions he shall retire ICCs if they want report and account for the benefit associated with the project implementation": There was no GHG reporting within the scope of the project activity. In the event of such reporting in the future, ICCs for the GHG emissions subject to reporting will be retired.
5. "Where GHG emission mitigations will be used for reporting purposes under the accounting rules set out by the Paris Agreement or other emission trading programs (such as CORSIA) operating under the accounting framework of the Paris Agreement (international trading), they shall conform to all relevant requirements of that market, including measures to prevent double claiming, i.e. corresponding adjustment. Project proponents shall provide evidence that the GHG emission mitigations generated by their project, and used for reporting, have fully conformed (or will conform) with all relevant market requirements. This evidence shall be utilized to designate ICCs that meet the specific market criteria.": The project complies with CORSIA requirements.

1.10 Funding

The project activity does not have any public or ODA fundings. The project is financed by the project proponent.

1.11 Ownership

The project proponent (Kalehan Genç Enerji Üretim A.Ş.) has full and uncontested legal ownership of the emission reductions that are generated under this ICR project, and has legal rights concerning changes in use of resources required to service the project. Evidence of ownership have been demonstrated in Appendix I.

1.12 Other certifications

The project proponent has ISO 27001:2022 certificate

1.13 Double counting, issuance and claiming

The project is exclusively seeking registration under the ICR. Therefore, there will be no double counting of emission reductions or claims.

1.13.1 Other registration and double issuance

Is the project registered or intends to be registered with another GHG program?

☐ Yes

☒ No

The project had a submission in Global Carbon Council on 08/03/2022, however, it was decided to abandon this submission and move on to registration for ICR. The project only had a submission and no request for registration was made. Since there is no de-registration procedure in GCC yet, the submission has not been officially canceled, but there will be no registration request within this submission and this submission will be officially canceled when GCC's de-registration procedure is

published. Apart from this, there is no registration or registration request within any other GHG program. A "Declaration of Non-Issuance" is presented stating that the project proponent is exclusively seeking ICR registration for this project and will not request registration for another GHG program.

Has the project been rejected by another GHG program
☐ Yes
☒ No

GHG program	Global Carbon Council
Project ID	S00236
Link	https://projects.globalcarboncouncil.com/project/203
Status	Submitted and listed (Project proponent have decided to cancel the submission, but as it is explained above, the de-registration has not occurred yet)

1.13.2 Double claiming and other instruments

Are the project activities also included in a GHG emissions trading program or subject to binding emission limit?

☐ Yes
☒ No

Has the project activity applied for, received, or is planning to receive instruments from another GHG-related environmental crediting system, e.g. IREC or Guarantees of Origin.

☐ Yes
☒ No

GHG program	N/A
Project ID	N/A
Link	N/A
Status	N/A

Do project activities affect GHG emissions accounted for within a value chain (goods/service, i.e. scope 3 emissions and the project proponent or Authorized representative a buyer or a seller of such goods/services?

☐ Yes

☒ No

1.14 Other benefits

The project is expected to contribute 3 SDGs which are SDG 7, 8 and 13.

SDG 7 – Affordable and Clean Energy: The project increases the renewable energy share in Türkiye's electricity generation by providing 1,193,170 MWh clean energy to the Turkish National Grid annually.
The project contributes to the goal 7.2 and indicator 7.2.1.

SDG 8 – Decent Work and Economic Growth: The project activity has created 116 job opportunities in the renewable energy sector and contribute to the local economy by employing 46 people from the local villages around the site area. Also, many employment opportunities have been created as short-term employments during the construction phase.
The project contributes to the goal 8.5 and indicator 8.5.1.

SDG 13 – Climate Action: The project contributes to improve the environmental quality as avoiding fossil fuel-based electricity generation by producing clean renewable energy from hydropower. The project activity contributes to the goal by eliminating 662,447 tCO2 through generating clean energy and it to the Turkish National Grid.
The project contributes to the following target 13.3. and following indicator 13.3.2.

Identification of SDG contributions Please provide information on SDGs the projects impact and how the project achieves them.			
SDG target	Indicator (text from the SDG indicator)	Net impact (activities to increase or decrease)	Contributions
7. Affordable and clean energy	7.2.1 Renewable energy share in the total final energy consumption	Increasing the renewable energy share in Türkiye's total electricity generation mix.	1,193,170 MWh/year Türkiye aims to increase renewable energy sources in primary energy consumption by 20.4% by 2030[5] . The establishment of Aşağı Kaleköy HPP contributes to this goal.
8. Decent work and economic growth	8.5.1 Average hourly earnings of female and male employees, by occupation, age and persons with disabilities	Creating job opportunities in the renewable energy sector in the local area.	116 people are employed in the project site. 46 of these employees were employed from the area where the power plant is located, and 32 from the surrounding provinces of Bingöl province, where the power plant is located. The remaining 38 employees were employed from various provinces of the host country.

[5] https://iklim.gov.tr/db/turkce/dokumanlar/turkiye-cumhuriyeti--8230-102-20230512125223.pdf

			Within the scope of the National Rural Development Strategy[6], Turkey aims to increase the employment of citizens living in rural areas. The establishment of Aşağı Kaleköy HPP and providing local employment contributes to this goal of the country.
13. Climate action	13.2.2 Total greenhouse gas emissions per year	Eliminating carbon emissions by generating clean energy	662,447 tCO2e / year Aşağı Kaleköy HPP contributes to the emission reduction NDC declared within the Paris Agreement by generating renewable energy and reducing Turkey's emissions in electricity generation.

[6] https://www.tarimorman.gov.tr/TRGM/Belgeler/UKKS-Strateji-Belgesi.pdf

1.15 Host country attestation

Among the CORSIA requirements is the submission of the Host Country Letter of Authorization (HCLOA) for Double Counting. No HCLOA is required for carbon credits issued between 12/03/2020 and 31/12/2020. There is currently no mandatory mechanism for this situation in Türkiye. However, if there is a regulation regarding this in the future, HCLOA will be submitted during the verification period for carbon credits to be obtained after 01/01/2021.

☐ Host country attestation

☒ No host country attestation

1.16 Additional information

The project complies with the mandatory laws and regulations listed below:

• Electricity Market Law (Enacted on 30/03/2013)

• Law on Utilization of Renewable Energy Resources for the Purpose of Generation Electricity (Enacted on 18/05/2005)

• Energy Efficiency Law (Enacted on 02/05/2007)

• Environment Law (Enacted on 25/11/2014)

• Forest Law (Enacted on 08/09/1956)

The generation license of the project has been issued considering the Law on Utilization of Renewable Energy Resources for the Purpose of Generation Electricity. The EIA approval received on 07/09/2016 shows that the power plant complies with the Environmental Law. The forest permit taken on 04/05/2017 shows that the power plant complies with the Forest Law.

1.16.1 Confidential/sensitive information

The numerical data for the realized investment and operational expenses in Section 5.5 were not included in the public version of the project design description.

2. Crediting

2.1 Project start date

Project start date	12/03/2020

2.2 Expected operational lifetime or termination date

The project is licensed on 21/05/2014. As it is stated in the generation license issued by the Energy Market Regulatory Authority, this license is valid for 42 years, 3 months and 16 days from the date of issue, Until September 2056. Considering the project start date of March 2020, the expected operational lifetime of the project activity is estimated as 36 years.

2.3 Crediting period

Start date of crediting	12/03/2020
Crediting period	☐ Five years, renewable twice. ☒ Ten years, fixed. ☐ Fifteen years, renewable twice (CDR only). ☐ Other, provide information on how that conforms with ICR requirement document.

2.4 Calendar year of crediting

Calendar year of crediting	Estimated GHG emission mitigations (t CO2-e)
12/03/2020 to 31/12/2020	535,403
01/01/2021 to 31/12/2021	662,447
01/01/2022 to 31/12/2022	662,447
01/01/2023 to 31/12/2023	662,447
01/01/2024 to 31/12/2024	662,447
01/01/2025 to 31/12/2025	662,447
01/01/2026 to 31/12/2026	662,447
01/01/2027 to 31/12/2027	662,447

01/01/2028 to 31/12/2028	662,447
01/01/2029 to 31/12/2029	662,447
01/01/2030 to 11/03/2030	127,044
Total estimated GHG emission mitigations during the crediting period (t CO2-e)	6,624,470
Total number of years (yrs)	10
Annual average (t CO2-e)	662,447

3. Safeguards

3.1 Statutory requirements

The project complies with the mandatory laws and regulations listed below:
• Electricity Market Law (Enacted on 30/03/2013)
• Law on Utilization of Renewable Energy Resources for the Purpose of Generation Electricity (Enacted on 18/05/2005)
• Energy Efficiency Law (Enacted on 02/05/2007)
• Environment Law (Enacted on 25/11/2014)
• Forest Law (Enacted on 08/09/1956)

The generation license of the project has been issued considering the Law on Utilization of Renewable Energy Resources for the Purpose of Generation Electricity. The EIA approval received on 07/09/2016 shows that the power plant complies with the Environmental Law. The forest permit taken on 04/05/2017 shows that the power plant complies with the Forest Law.

3.2 Potential negative environmental and socio-economic impacts

The negative effects that may occur due to the installation of a hydro power plant and the measures taken on these issues can be summarized as follows:

1. **Species Diversity:** Of the 6 fish species living in the study area, only one species in the LC (Least Concern) category. It is known that making fish passages is not functional in dams or regulators with a body height of more than 30 meters. The height of the aforementioned Aşağı Kaleköy Dam thalweg is 93 m and the construction of a fish passage is not considered possible. Within the scope of the project activities, the water height and water velocity are 1.06 m (106 cm) for 21.19 m3/s, 1.12 m (112 cm) for 0.96 m/s and 23.34 m3/s, 0, It is determined as 99 m/s. The amount of environmental/ecosystem water to be released into the stream bed was determined as 21.19 m^3/s in the July-March period and 23.34 m^3/s in the April-May-June period. Considering these data, it can be concluded that the project will not have a significant impact in terms of hydro-biological parameters in terms of sustainable ecosystem diversity.[7]
2. **Reliability of Water Supply:** The water used for electricity is released back to the Murat River without any chemical change and at the same amount and quality. Lifeline water is determined by State Hydraulic Works Flow Stations. Therefore, agricultural and husbandry activities are not affected by the project activity. Since those activities are not affected, no relocation is needed.[8]
3. **Generation of Waste:** Domestic wastes occurring due to project activity are collected through recycle bins in site area and are disposed of by waste collection companies.
4. **Generation of Hazardous Waste:** Hazardous wastes and waste oils that may occur during the operation phase will be collected separately from other wastes in an insulated area and will be collected and disposed of by licensed companies when they reach a certain amount. Hazardous wastes to be disposed of will be recorded in the online system of the Ministry and notifications will be made

[7] EIA Report pg. 142
[8] EIA Report pg. 141

5. **Soil Erosion:** There is a detailed report on the risk of soil erosion in the EIA report. According to the EIA report, there is a risk of erosion in some parts of the site area. All necessary precautions will be taken against landslides and erosion.[9]
6. **Displacement of People:** Private lands open to expropriation were expropriated by the Energy Market Regulatory Authority in accordance with the "Expropriation Law" No. 2942. All kinds of damages and losses during expropriation procedures were covered by the project owner.

3.3 Consultation with interested parties and communications

Power plants in Türkiye are subject to Enviromental Impact Assessment. According to the type and capacity of the plant, it is evaluated as "EIA is required" or "EIA is not required". For plants where EIA is required, a local stakeholder meeting must be held under this certificate. Within the scope of the mentioned EIA process, a local stakeholder meeting for Aşağı Kaleköy HPP was organized on 29/03/2016 at 10:00 in Genç Public Education Center, Genç/Bingöl. In order to be informed about the meetings, necessary advertisements were placed in the national newspapers and announced to the citizens.

At the Genç Public Education Center, where the meeting was held, the participants were presented with the project.

Due to lack of information of these meetings and the opinions of local stakeholders in the EIA report and long time passed since these meetings, a project impact assessment form was distributed to learn the current thoughts of the local people about the power plant.

In order to carry out this assessment, the headmen of the surrounding settlements were contacted, the mentioned forms were distributed to the headman's offices, and were announced to the local people through the headman's office. The forms were filled out by 10 local people between 24/01/2022 and 31/01/2022, thus obtaining information about the local people's current thoughts about the project. All forms are in Turkish, the main language of the country

In this assessment, conducted with 10 people from the surrounding region, questions were asked about the various impacts of the project and their opinions were taken. These people were contacted within the scope of the comments made, and their concerns about the negative effects of the project were resolved. The information in Section 3.3.1 shows the results of this study.

It is important for the Project Owner to monitor the on-going stakeholder engagement process to ensure that consultation and disclosure efforts are effective, and stakeholders delivering grievances have been meaningfully consulted throughout the process. Therefore, a Stakeholder Engagement Plan is executed by the Project Owner. The contact information of the plant responsible exists at the Mukhtars, the project owner and local community are always in touch. The project owner regularly checks with the Mukhtars if any complaint or a request exists. Any complaint or need from the local community could directly be received by the project owner and appropriate contributions or improvements are made to the local community.

[9] EIA Report pg. 40

3.3.1 Stakeholders and consultation

Stakeholder	Local people living around the power plant
Legal rights	Local stakeholders have land rights over the areas that the power plant can affect.
Diversity	Since most of the people working in the construction or operation of the power plant are employed from the surrounding community, it cannot be said that there is diversity between the project proponent and local stakeholders.
Location	All stakeholders reside in the villages around the power plant in Genç/Bingöl.
Effects	The power plant may have negative impacts on the surrounding community: • Change in the climate of the region due to the reservoir area • If the waste from the power plant is not disposed of properly, the negative impact of the waste on the environment Additionally, the establishment a power plant will have a positive impact on employment in the region.
Date of consultation	24/01/2022 – 31/01/2022
Stakeholder engagement	In order to carry out this assessment, the headmen of the surrounding settlements were contacted, the mentioned forms were distributed to the headman's offices, and were announced to the local people through the headman's office. All forms are prepared in Turkish, the local language.
Consultation	Stakeholders were contacted and contact information of the plant responsible was shared
Stakeholder input	As stated in the "Public comments" section below, no negative comments received.
Free prior informed consent	N/A
Conclusion	After the meeting with stakeholders, it is concluded that no negative effects are present for the local people
Ongoing consultation	The contact information of the plant responsible was shared with the stakeholders and it was stated that the project proponent and local community would always be in touch. Additionally, the local community can communicate with power plant employees through headmen of their village.

3.3.1 Public comments

Comments received	Action taken
No negative comments	-

3.4 Environmental impact assessment

An Environmental Impact Assessment has been prepared in accordance with Turkey' national standards. Approval from the Ministry of Environment and Urbanization was taken on 07/09/2016. Thus, the project is considered to be implemented as long as the environmental precautions stated in the EIA report are applied.

According to the EIA report, some of the precautions that will be taken are:

- There is a report prepared for the purpose of planting for soil management purposes, planting for erosion control and areas where structural measures should be taken, planting for screening purposes, planting for the repair of temporary facilities and construction areas, and planting for river valley improvements.[10]
- Methods to prevent erosion risk are explained in detail in the planting section of the report to prevent erosion[11], and application information is explained in detail under the title of biological and technical repair[12].[13]
- The amount and characteristics of solid waste from housing, social and administrative facilities, where and how these wastes will be transported or for what purposes and how they will be evaluated and how they will be disposed of are shown in the report.[14]
- The possible effects on forest areas (including forest fires) and the measures to be taken against these effects are shown in the report.[15]
- Possible effects and measures to be taken on terrestrial flora/fauna are shown in the report.[16]
- Climate change (increase in average relative humidity, microclimatic effect, etc.) that may occur due to impoundment and the possible effects on habitat and biotopes as a result of this change are shown in the report.[17]
- As a result of the use of the source from which the water will be supplied, the possible effects on the water quality and the living creatures in the aquatic environment (the living species on the route where the life water will be released and their ecological inventory) (the amount of water required for fish species, the amount of dissolved oxygen, water velocity, water depth) are examined and the effects of the project on these species are determined. evaluation) and the measures to be taken are shown in the report.[18]

3.5 Risk assessment

There are no major risks associated with the project operation and GHG mitigations.

The operation of the project is carried out in accordance with Turkey's laws and regulations.

Possible risks within the project operation and mitigation measures for these risks are listed in the table below:

[10] EIA Report, pg. 205
[11] EIA Report, pg. 204-205
[12] EIA Report, pg. 205
[13] EIA Report, pg. 174
[14] EIA Report, pg. 147-148
[15] EIA Report, pg. 145
[16] EIA Report, pg. 143
[17] EIA Report, pg. 142-143
[18] EIA Report, pg. 141-142

	Risks identified	Mitigation measures
Risk 1	Miscalculation of Emission Reductions	The values to be used in GHG emission calculations will be the official values in Türkiye. Since the emission factor is determined by the ministry, there is no risk of miscalculation of this value. Since the generation values of the power plant will be taken through the EPİAŞ system, which is an official institution in Türkiye, there is no risk of miscalculating the generation
Risk 2	Operational Risks	All operational risks that may occur are minimized with regular maintenance activities. With the technical qualification of the plant employees and the immediate intervention of mechanical failures that may occur in the field, the power generation of the plant is not interrupted.
Risk 3	Possible negative effects on local population	The negative impacts that may occur on the local people living around the project area have been mitigated in accordance with Turkish laws and regulations. The project does not have a negative impact on the local people in terms of the environment. It can be said that the project has a positive impact in terms of the employment provided to the local people. There is constant communication between the project owner and the local people. The contact information of the plant responsible exists at the Mukhtars, the project owner and local community are always in touch. The project owner regularly checks with the Mukhtars if any complaint or a request exists. Any complaint or need from the local community could directly be received by the project owner and appropriate contributions or improvements are made to the local community
Risk 4	Possibility of occupational accidents	Employees at the Power Plant site receive OHS training every year within the scope of the Occupational Health and Safety Law. Within the scope of this training, all employees are trained on the precautions to be taken to prevent possible accidents and what to do to minimize damage in the event of a work accident.
Risk 5	Possible environmental damage from waste generated at the power plant	All waste generated in the power plant area is disposed of in accordance with the relevant waste regulations, thus preventing possible damage to the environment.

		Domestic wastes are disposed of by waste collection companies. In addition, site employees were provided with training on zero waste regulations and their practices in the power plant site. Hazardous wastes are disposed of by waste disposal companies. There is an isolated building in the project area where hazardous waste is collected. In order to prevent hazardous waste from harming the project environment, these wastes are kept in this building until they are disposed of.
Risk 6	Possible negative effect on local species	Of the 12 fish species living in the study area, 2 species are in the LC (Least Concern) category. It is known that fish passages is not functional in dams or regulators with a body height of more than 30 meters. The height of the aforementioned Yukarı Kaleköy Dam thalweg is 137.5 m and the construction of a fish passage is not considered possible. The works of the dam regarding the fish pass will be carried out in line with the opinion of the relevant institution. In April-July, which is the larval laying period of aquatic fauna, the works will be minimized, especially noise, dust, etc. Loosening blasts, where the effects will be intense, will not be made in this period. Substances that harm aquatic fauna or production vehicles, materials, equipment and tools shall not be spilled into the river or its vicinity. Necessary permits shall be obtained before any attempt is made that may adversely affect reproduction and production, such as filling the river, drying it, changing its shape partially or completely, or removing sand, gravel, stones, pouring stone soil, rubble and similar materials. All necessary precautions will be taken during these works.

3.5.1 Additional information on risk management

N/A

4. Methodology

4.1 Reference to applied methodology and applied tools

The United Nations approved consolidated baseline methodology applicable to this project is ACM0002: Grid-connected electricity generation from renewable sources --- Version 21.0[19].

ACM0002 refers to the following tools:

- TOOL 01: Tool for the demonstration and assessment of additionality, version 07.0.0 [20]
- TOOL 07: Tool to calculate the emission factor for an electricity system, version 07.0[21]
- TOOL 24: Common Practice, version 03.1[22]
- TOOL 27: Investment Analysis, version 13.0[23]

Type (methodology, tool, module)	Reference ID	Version	Title
Methodology	ACM0002	21.0	Grid-connected electricity generation from renewable sources
Tool	TOOL01	07.0.0	Tool for the demonstration and assessment of additionality
Tool	TOOL07	07.0	Tool to calculate the emission factor for an electricity system
Tool	TOOL24	03.1	Common Practice
Tool	TOOL27	13.0	Investment Analysis

4.2 Applicability of methodology

The 500 MWe Aşağı Kaleköy HPP is a hydropower power type, greenfield, renewable, grid connected electricity generation project. Since the total installed capacity is more than 15 MW, large scale methodology "ACM0002: Grid-connected electricity generation from renewable sources --- Version 21.0" has been used. Applicability criterias and how the project meets these criterias are given in below:

Methodology ID	Applicability condition	Justification
ACM0002	This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s);	The project activity involves a new installation of a hydro power plant. Hence, the methodology is applicable.

[19] https://cdm.unfccc.int/UserManagement/FileStorage/ZPFJL01OU2RYC6N3HASIXV7K84QBG9
[20] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
[21] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[22] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf
[23] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v13.pdf

	(c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s)	
ACM0002	In case the project activity involves the integration of a BESS, the methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Integrate BESS with a Greenfield power plant; (b) Integrate a BESS together with implementing a capacity addition to (an) existing solar photovoltaic1 or wind power plant(s)/unit(s); (c) Integrate a BESS to (an) existing solar photovoltaic or wind power plant(s)/unit(s) without implementing any other changes to the existing plant(s); (d) Integrate a BESS together with implementing a retrofit of (an) existing solar photovoltaic or wind power plant(s)/unit(s).	The project does not involve the integration of a BESS.
ACM0002	The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or	a) The project is a hydro power plant. b) The project does not involve capacity additions, retrofits, rehabilitations or replacements. c) The project does not involve the integration of a BESS. d) The project does not involve the integration of a BESS.

	rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity (c) In case of Greenfield project activities applicable under paragraph 5 (a) above, the project participants shall demonstrate that the BESS was an integral part of the design of the renewable energy project activity (e.g. by referring to feasibility studies or investment decision documents); (d) The BESS should be charged with electricity generated from the associated renewable energy power plant(s). Only during exigencies 2 may the BESS be charged with electricity from the grid or a fossil fuel electricity generator. In such cases, the corresponding GHG emissions shall be accounted for as project emissions following the requirements under section 5.4.4 below. The charging using the grid or using fossil fuel electricity generator should not amount to more than 2 per cent of the electricity generated by the project renewable energy plant during a monitoring period. During the time periods (e.g. week(s), months(s)) when the BESS consumes more than 2 per cent of the electricity for charging, the project participant shall not be entitled to issuance of the certified emission reductions for the concerned periods of the monitoring period.	
ACM0002	In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density,	The condition applying to the project activity is as follows: a) The project is not implemented in existing single or multiple reservoirs; hence this condition is not applicable. b) The project is not implemented in existing single or multiple reservoirs; hence this condition is not applicable.

	calculated using equation (3)[24], is greater than 4 W/m2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3)[25], is greater than 4 W/m2. (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m2 ; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m2. The power density has been calculated as 33.11 W/m2. d) The project is not an integrated hydro power project.
ACM0002	In the case of integrated hydro power projects, project participants shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the	The project is not an integrated hydro power project, this condition is not applicable.

[24] Please see power density equation in Section 8.1.2.
[25] Please see power density equation in Section 8.1.2.

	requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum of five years prior to the implementation of the CDM project activity.	
ACM0002	The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	The project does not involve switching from fossil fuels to renewable energy sources and is not a biomass fired power plant.
ACM0002	In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The project does not involve retrofits, rehabilitations, replacements, and it's not a capacity addition.

For the applicability of "Tool to calculate the emission factor for an electricity system, ver 07.0", following conditions are met:

Tool ID	Applicability condition	Justification
07	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid	The project is a hydro power plant providing clean energy to the Turkish National Grid.

	(e.g. demand-side energy efficiency projects).	
07	Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	The project is a grid connected power plant.
07	In case of CDM projects, the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	As the project is not a CDM project and the ICR program accepts projects from worldwide, this condition is not applicable.
07	Under this tool, the value applied to the CO2 emission factor of biofuels is zero.	As the project does not involve biofuels, this condition is not applicable.

For the applicability of "Tool for the demonstration and assessment of additionality, Version 07", following conditions are met:

Tool ID	Applicability condition	Justification
01	The use of the "Tool for the demonstration and assessment of additionality" is not mandatory for project participants when proposing new methodologies. Project participants may propose alternative methods to demonstrate additionality for consideration by the Executive Board.	Since the project does not include the proposal of new methodologies, this condition is not applicable.

	They may also submit revisions to approved methodologies using the additionality tool.	
01	Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory.	Since the additionally tool is included in the approved methodology, it is used in this project

For the applicability of "Common Practice, Version 03.1", following conditions are met:

Tool ID	Applicability condition	Justification
24	This methodological tool is applicable to project activities that apply the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", or baseline and monitoring methodologies that use the common practice test for the demonstration of additionality.	Since this tools application is required in the approved methodology, it is used in this project
24	In case the applied approved baseline and monitoring methodology defines approaches for the conduction of the common practice test that are different from those described in this methodological tool, the requirements contained in the methodology shall prevail.	Since this tools application is required in the approved methodology, it is used in this project

For the applicability of "Investment analysis, Version 13.0", following conditions are met:

Tool ID	Applicability condition	Justification
27	This methodological tool is applicable to project activities that apply the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", the guidelines "Non-binding best practice examples to demonstrate additionality for SSC project activities", or baseline and monitoring methodologies that use the	Since this tools application is required in the "Tool for the demonstration and assessment of additionality", it is used in this project.

	investment analysis for the demonstration of additionality and/or the identification of the baseline scenario.	
27	In case the applied approved baseline and monitoring methodology contains requirements for the investment analysis that are different from those described in this methodological tool, the requirements contained in the methodology shall prevail.	Applied methodologies in this project does not contain requirements that are different from TOOL 27.

4.3 Deviation from applied methodology

There were no deviations in the methodologies used.

Methodology ID	Requirement	Deviation	Justification
N/A	N/A	N/A	N/A

4.4 Other Information relating to methodology application

N/A

5. Additionality

TOOL01: Tool for the demonstration and assessment of additionality, Version 07 is used to demonstrate the additionality of the project in the following sub sections.

5.1 Level 1 - ISO 14064-2 GHG emissions additionality

It is stated in ICR Requirement Document v5.0 as “GHG emission mitigations shall be additional to the baseline scenario. ISO 14064-2 addresses additionality as the project proponent shall select or establish, justify, and apply criteria and procedures for demonstrating that the project results in GHG emissions mitigations that are additional to what would occur compared to the determined GHG baseline.”

According to this document, ACM0002 v21.0 is used to address the GHG mitigations of the project activity in comparison with the baseline scenario.

Using this methodology satisfies the Level 1 additionality criteria. Sections 6,7 and 8 and ER calculation sheets demonstrates the GHG reductions of the project activity.

5.2 Level 2a – Statutory additionality

The project is not enforced by any laws or regulations. Applicable laws and regulations are listed below:

- Electricity Market Law (Enacted on 30/03/2013)
- Law on Utilization of Renewable Energy Resources for the Purpose of Generation Electricity (Enacted on 18/05/2005)
- Energy Efficiency Law (Enacted on 02/05/2007)
- Environment Law (Enacted on 25/11/2014)

• Forest Law (Enacted on 08/09/1956)

As a result, the project activity satisfies Level 2a additionality

5.3 Level 2b – Non-enforcement additionality

Project activity is not subject to statuary requirements in Türkiye

5.4 Level 3 – Technology, institutional, common practice additionality

Common Practice Analysis

The section provides the Common Practice Analysis as step 4 of the "Tool for the demonstration and assessment of additionality, version 7.0.0" and "Common Practice, version 03.1".

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

The project's installed capacity is 500 MWe. Therefore, total capacity of power plants which will be included in the analysis will be between 250 MW – 750MW

Step 2: Identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

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

Applicable geographical area is Turkey.

b) The projects apply the same measure as the proposed project activity;
Renewable Energy Projects

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;
Hydroelectric Power Plants

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;
This condition is not applicable

e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
Range is in between 250 MW – 750 MW

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 first agreement signed after the investment decision of the hydro power plant is 11/04/2016. Therefore, projects which started commercial operation before 11/04/2016, have been considered for analysis.

There are 15 projects meeting the above criteria.

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}.

Project activities which have registered CDM activities[26], submitted for registration or undergoing validation have been excluded. After excluding these projects, N_{all} would be 12. Remaining projects are listed in Table 1 below.

Table 2. Nall Projects

Name of the Power Plant	Capacity (MWe)	License Type
Yedigöze HES	310.66	IPP
Hasan Uğurlu HES	500	EÜAŞ
Berke HES	510	EÜAŞ
Oymapınar HES	540	Autoproducer
Deriner HES	669.6	EÜAŞ
Birecik-Nizip HES	672	EÜAŞ
Altınkaya HES	702.55	EÜAŞ
Beyhan-1 HES	582.1	IPP
Gökçekaya HES	278.4	EÜAŞ
Sır HES	283.5	EÜAŞ
Borçka HES	300.6	EÜAŞ
Ermenek HES	302.4	EÜAŞ

Therefore, N_{all} = 12

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 N_{diff}.

As per paragraph 12 of the Tool 24 v3.1, projects differ between "investment climate on the date of the investment decision", such as (ii) Subsidies or other financial flows; (iii) Promotional policies; (iv) Legal regulations, have been accepted as N_{diff}. These projects are Privatized, Autoproducer, owned by a public institution (EÜAŞ) and owned by Build–operate–transfer (BOT) company. Since investment climate was totally different as capital budget was used, subsidies and promotional policies were provided for these projects, they have been classified as N_{diff}.

According to the latest version of Tool 24, there are technologies applied different than the proposed project activity. Aşağı Kaleköy HPP is a power plant established and operated by the private sector. 9 of the power plants on the N_{all} list are operated by EÜAŞ and 1 has an autoproducer license. As it is

[26] Projects with voluntary carbon project standards (Gold Standard, Verra, GCC, ICR and Global Emission Standard) and IREC registrations were taken as CDM activities.

explained in the above paragraph, all of these power plants have a different investment climate. As a result, N_{diff} is calculated as 10.

Calculate factor $F=1-N_{diff}/N_{all}$ 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

- $F = 1 – 10 / 12 = 0.167$
- $N_{all} - N_{diff} = 12 - 10 = 2$

Since the proposed project activity would be common practice only both of the following conditions apply.
$F > 0.2$ and $N_{all} - N_{diff} > 3$
Outcome
Since $F = 0.167$ and $N_{all} – N_{diff} = 2$, the project activity is not common practice and therefore the project is additional.

5.5 Level 4a – Financial additionality I

Methodological tool: “Investment analysis, Version 13.0 (Tool 27)” is taken into account when applying this step.

There are three options for investment analysis method:
- Simple Cost Analysis
- Investment Comparison Analysis and
- Benchmark Analysis

As the project gains revenue from the sale of generated electricity, Simple Cost Analysis is not applicable. Investment Comparison Analysis is also not applicable as no alternative investment is the point at issue. Therefore, Benchmark Analysis will be used for the evaluation of the project investment.

For the purpose of benchmark analysis Project IRR after tax has been chosen as the indicator. There are no available benchmarks for hydro power plant projects in the Republic of Türkiye . The credibility of a particular project is evaluated on the basis of several factors including cost recovery period, risk of postponed commissioning and credibility of the project proponent.

Local Commercial Lending Rates
According to Tool 27 v13.0 para 15: “The applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or WACC are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate”. As the tool implies local commercial lending rate is appropriate benchmarks for a project IRR, it has been chosen as a benchmark.

The lending rates for medium term investments are provided by Strategy and Budget Presidency of the Republic of Türkiye[27].

Strategy and Budget Presidency of the Republic of Türkiye publishes "Main Economic Indicators" on a monthly basis. The lending rates for January-June 2016 have been given in Table 2 below.

Table 3. Turkish Development Bank (TKB) Interest Rates

Year	Month	Medium Term Investment Rate
2016	1	12.5%
	2	12.5%
	3	12.5%
	4	12.5%
	5	12.5%
	6	12.5%

The investment decision was taken on 10/03/2016. Therefore, the interest rate for March 2016, 12.5%, has been chosen as the benchmark.

Table 4. Milestones of the project

Date	Milestone
21/05/2014	Generation License
October 2015	Feasibility Report
10/03/2016	Investment Decision Date (Board Decision)
11/04/2016	Energy Transmission Line Survey Project Contract – First agreement after the investment decision date
07/09/2016	EIA Approval
04/05/2017	Forestry Permit
12/03/2020	Commissioning Date of Unit 4
15/05/2020	Commissioning Date of Unit 1
19/11/2020	Commissioning Date of Unit 3
17/12/2020	Commissioning Date of Unit 2 – Full Development

Calculation and comparison of financial indicators

Following table summarizes the financial figures for the project operation:

Table 5. Financial parameters of Aşağı Kaleköy HPP

Parameter	Unit	Value	Source
Energy Generation per year	MWh/year	1,193,170	Generation License – May 2014
Investment Amount of Civil Works	USD	384,317,353	Feasibility Report – Oct 2015

[27] https://www.sbb.gov.tr/wp-content/uploads/2021/12/13-faiz_orani.xls

Investment Amount of Electromechanical Works	USD	193,946,940	Feasibility Report – Oct 2015
Other Investment Expenses	USD	8,924,500	Feasibility Report – Oct 2015
Total Investment Amount	USD	587,188,793	Feasibility Report – Oct 2015
Operational Costs	USD/year	5,631,133	Feasibility Report – Oct 2015
Revenues	USD/year	97,183,697 : First 5 years 87,101,410 : 5-10 years	Generation License – Oct 2015 & Electricity Tariff – Page 10/11
Electricity Tariff	USD/MWh	81.45 : First 5 years 73.00 : 5-10 years	Law No: 5346 - https://www.mevzuat.gov.tr/mevzuatmetin/1.5.5346.pdf – Page 10/11
Depreciation Period	Year	40 years : Civil Works 15 years: EM Works 30 years: Other Works	Depreciated economic assets, Turkish Revenue Administration: https://www.gib.gov.tr/sites/default/files/fileadmin/user_upload/Yararli_Bilgiler/amortisman_oranlari.pdf Page 1/Row 1.2.1 Page 21/Row 45.1.2.2 Page 21/Row 45.2.1
Income Tax Rate	%	20	Tax Regulation for 2012: https://www.vergidegundem.com/pb_kurumlar_vergisi_oranlari
Technical Lifetime	Year	36	Generation License – May 2014
USD/TL	USD/TRY	3.0	USD/TRY exchange rate at the time of the feasibility report

The Project Internal Rate of Return (IRR) after taxation of the project for 10 years is calculated as 7.60% without the ER revenue.

The revenue acquired from the operation of the power plant is not financially attractive to do the investment. Therefore, it is contended that the carbon revenues are required to make the project more financially attractive.

Sensitivity Analysis

The sensitivity analysis is applied in order to show that investment decision is not the most attractive alternative financially.

- Investment Cost
- Operating Cost
- Generation Value
- Tariff Rate

For a range of ±10% fluctuations in parameters above as advised in "Tool for the demonstration and assessment of additionality", Table 6 below has been obtained.

Table 6. Sensitivity Assessment of Aşağı Kaleköy HPP

Parameters	-10%	-5%	5%	10%
Investment Cost	9.17%	8.36%	6.90%	6.23%
Operational Cost	7.67%	7.64%	7.57%	7.53%
Generation Value	6.44%	7.03%	8.17%	8.73%
Tariff Rate	6.44%	7.03%	8.17%	8.73%

It may be seen from the sensitivity analysis, Project IRR value for the proposed project activity is less than the benchmark IRR (12.5%) for the 10 years.

The project IRR becomes 8.73% with a 10% rise in generation value and tariff rate, 7.67% with a 10% decrease in operational cost and 9.17% with a 10% decrease in investment costs. As a result, one can say that the project could be competitive neither a rise in price of electricity occurs nor the investment cost decrease.

Energy generation or tariff rate should increase 46% to reach 12.5%. The investment cost should decrease 28% to reach 12.5%. Even if we assume there will be no operational cost, benchmark value still does not reach 12.5%.

According to the end of work report, there was no decrease in the investment amount that would cause the IRR to exceed the benchmark. According to the company's 2023 balance sheet, there was a significant increase in operational expenses.

According to the realized generation data of the power plant, it is seen that the generation value in 2020 was 305,385 MWh, and the average generation between 2021-2023 was 782,829 MWh. If we take into account that the power plant was commissioned in mid-2020 and do not take the 2020 generation into account, it is seen that the power plant generated 34% less electricity than estimated.

As indicated in Table 5 above, the project's sales price of 81.45 USD/MWh for the first 5 years and 73 USD/MWh for operational years 6-10 are fixed , therefore, the tariff price has not changed.

Although the investment amount of the power plant has decreased, the fact that the operating costs have increased a lot due to the economic situation of the host country and the generation has turned out to be much lower than expected has adversely affected the financial continuity of the project. According to the IRR study conducted using the 2023 OPEX value, together with the realized investment amount and generation data, it has been observed that the IRR of the project is decreased to 4.60%. In order for the study to be conservative, it has been assumed that the OPEX values of all years except 2023 OPEX are/will be the same as the feasibility, and it has also been assumed that the generation values after 2023 will be the same as the generation license.

Outcome

The investment and sensitivity analysis shows that the carbon revenues will improve the Project IRR and make the project more attractive for investors. Considering that the figures above do not precisely reflect the investment risk (systematic and unsystematic risks) the role of the carbon income is significant to enable the project to proceed and for a favorable investment decision taken. Based on the analysis and information above, it is concluded that investing in the project is not the most attractive option considering the alternative investment opportunities. Therefore, Project can be considered as additional to the baseline scenario.

Without the carbon revenue the Internal Rate of Return of the projects cannot get close to the benchmark of 12.5%.

5.6 Level 4b – Financial additionality II

N/A

5.7 Level 5 – Policy additionality

According to Turkey's National Determined Contribution (NDC)[28], one of the country's energy sector targets is to reach approximately 35 GW of hydro-installed power capacity by 2030. In this context, the implementations of YEKDEM (Renewable Energy Resources Support Mechanism), YEKA (Renewable Energy Resource Areas Regulation) and YEK (Renewable Energy Law) have contributed significantly to the increase in the country's renewable energy investments.

The project complies with Turkey’s climate policies, contributes to the country’s NDC targets and related laws and regulations. The establishment of this project contributes to this goal of the country; therefore, it is considered that the implementation of the project lies within the scope of the climate action strategy towards the NDC of the host country.

[28] https://unfccc.int/sites/default/files/NDC/2023-04/T%C3%9CRK%C4%B0YE_UPDATED%201st%20NDC_EN.pdf

6. Baseline scenario

"ACM0002: Grid-connected electricity generation from renewable sources --- Version 21.0", a large scale UNFCCC methodology has been used in this project, along with the "Tool for the demonstration and assessment of additionality, version 07.0.0", "Tool to calculate the emission factor for an electricity system, version 07.0", "Common Practice, version 03.1", "Investment Analysis, version 13.0" methodologies.

According to the methodology baseline scenario has been identified as "the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources."

As an advanced developing country, Turkey has an increase in demand for electricity as seen in Figure 2, and it is expected continue in near future[29]. Electricity generation has mainly done by thermal power plants.

Figure 3 below shows the comparison of electricity generation capacity share between years 2010-2020. As it is seen in the chart, thermal power plants make up a large part of Turkey's electricity generation along with the hydro power plants[30]. In order to meet this energy demand, many high-capacity thermal power plants were established in Turkey. In the absence of this project, thermal power plants would be built to meet the demanded energy, thus increasing the GHG emissions in energy generation.

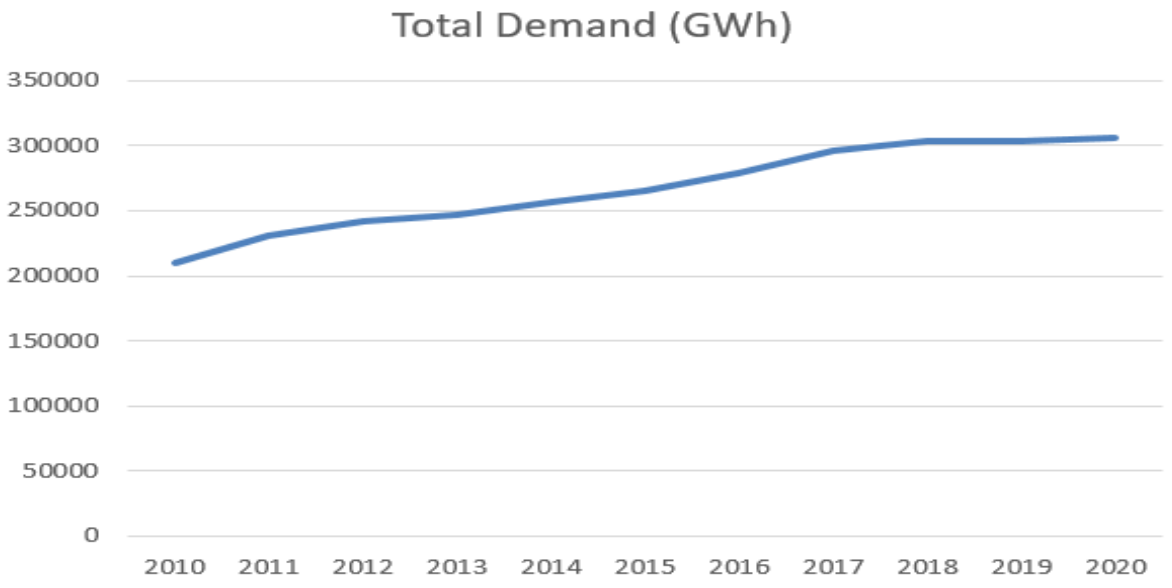

Figure 4. Türkiye's Total Electricity Demand, 2010 - 2020

[29] https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri
[30] https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri

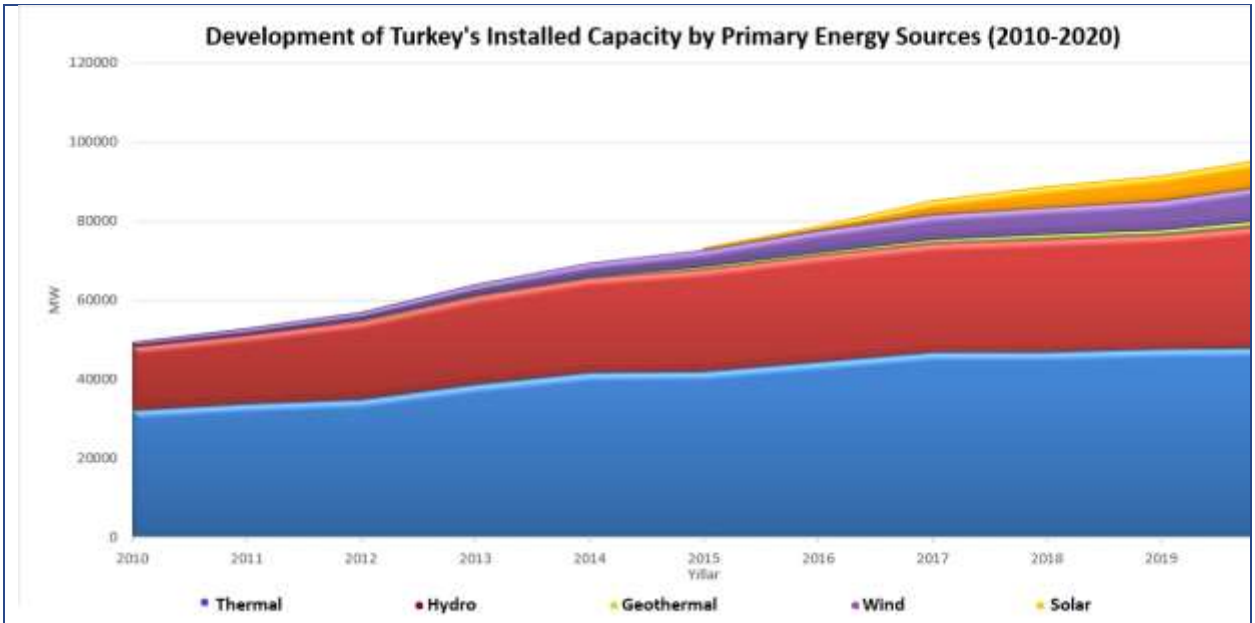

Figure 5. Development of Türkiye's Installed Capacity by Primary Energy Sources

7. Project boundary

The project boundary is considered as the National Electricity Grid of Turkey. As the electricity generated by the power plant supplied to the national grid, the project boundary defined as the national grid. The National Grid includes the project site and all grid-connected power plants to the National Grid

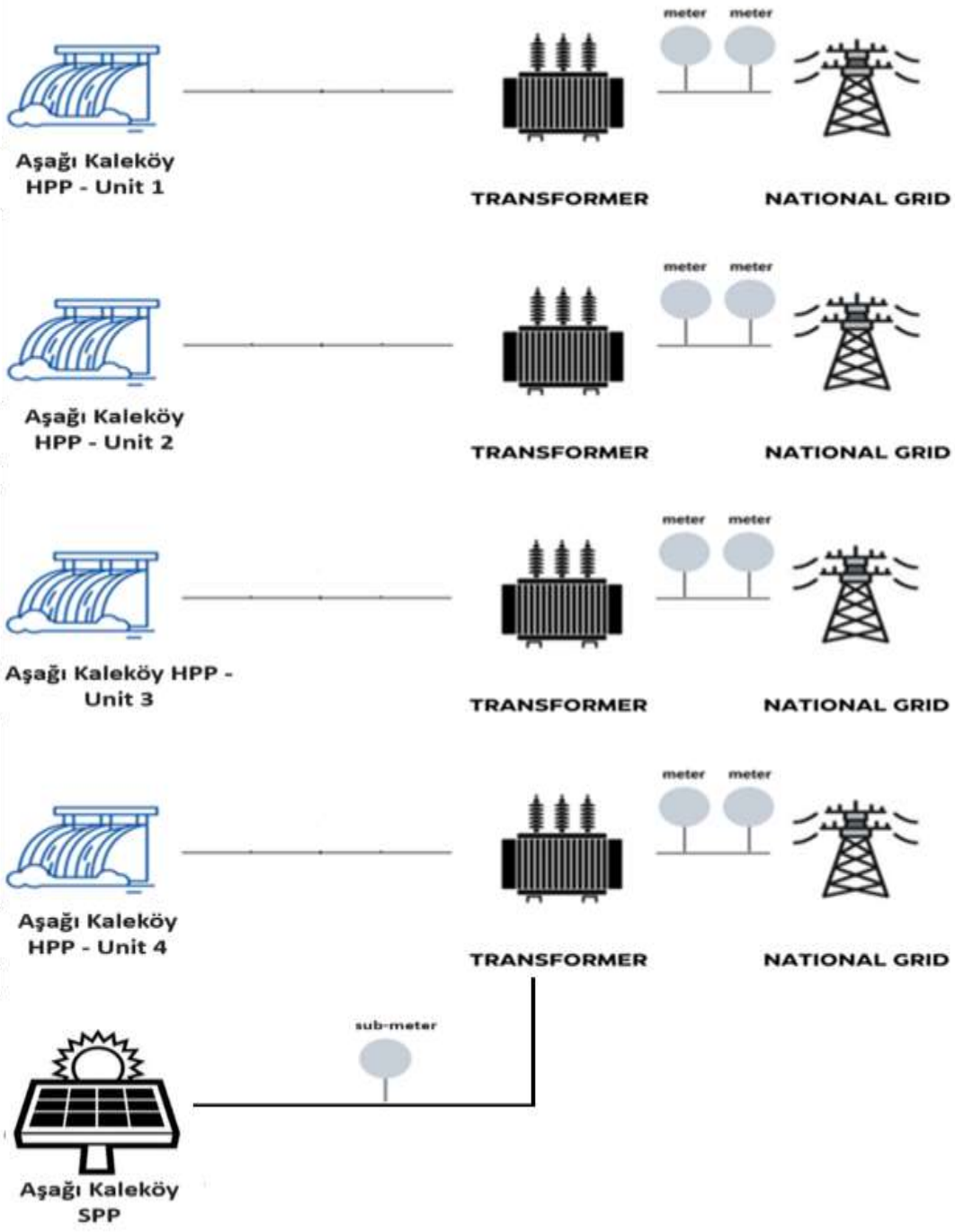

Figure 6. A simple diagram of project boundary

Table 7 Identification of GHG SSRs

SSR		Controlled/ related/ affected	GHGs	Included? Y/N	Justification/ explanation	Coordinates
Baseline	CO2 emissions caused by fossil-fuel based power plants for electricity generation	Affected	CO2	Yes	Main source. The main emissions from power plants in Turkish National Grid are in the form of CO2, therefore CO2 emissions caused by fossil-fuel based power plants connected to the grid will be accounted for baseline calculations	Turkish National Grid
		N/A	CH4	No	Minor emission source. Excluded for simplification.	N/A
		N/A	N2O	No	Minor emission source. Excluded for simplification.	N/A
Project	Emissions as a result of Project Activity	N/A	CO2	No	Minor emission source. Excluded for simplification	38.8302° N, 40.7066° E
		N/A	CH4	No	Minor emission source. Excluded for simplification	38.8302° N, 40.7066° E
		N/A	N2O	No	Minor emission source. Excluded for simplification	38.8302° N, 40.7066° E

8. Quantification of GHG emission mitigations

8.1 Criteria and procedures for quantification

Baseline Emissions

The baseline emissions are to be calculated as follows:

$$BEy = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{Equation (1)}$$

where;

BE_y = Baseline Emissions in year y (tCO_2e)

$EG_{PJ,y}$ = 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)

For greenfield power plants, quantity of net electricity generation is:

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

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

Calculation of Combined Margin

Operating, Build and Combined Margin Emission Factors of the Turkish National Grid have been published by the Ministry of Energy and Natural Resources on 02/09/2022. The Ministry has calculated the factors using the "Tool 07: Tool to calculate the emission factor for an electricity system v07.0". Since it's the latest available data, published by the ministry, these factors have been considered.

Calculation of the Operating Margin Emission Factor
It's been published as 0.7424 tCO2/MWh by the Ministry of Energy and Natural Resources.
Calculation of the Build Margin Emission Factor
It's been published as 0.3680 tCO2/MWh by the Ministry of Energy and Natural Resources.
Calculating of the Combined Margin Emission Factor
It's been published as 0.5552 tCO2/MWh by the Ministry of Energy and Natural Resources. .

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}$$

$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO2/MWh)

$EF_{grid,OM,y}$ = Operating margin CO2 emission factor in year y (tCO_2/MWh)

w_{OM} = Weighting of operating margin emissions factor (%)

w_{BM} = Weighting of build margin emissions factor (%)

According to the Tool, for hydro power generation project activities;

w_{OM} = 0.50 and w_{BM} = 0.50

Then:

$EF_{grid,CM,y}$ = 0.7424 tCO_2/MWh * 0.50 + 0.3680 tCO_2/MWh * 0.50 = 0.5552 tCO_2/MWh

The combined margin is calculated ex-ante and has been fixed for the crediting period.

Project Emissions

According to ACM0002 v21.0, Project Emissions are calculated based on the following formula:

$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} + PE_{BESS,y}$

where:

PE_y = Project emissions in year y (tCO_2/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of noncondensable gases in year y (tCO_2e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

$PE_{BESS,y}$ = Project emissions from charging of a BESS using electricity from the grid or from fossil fuel electricity generators (tCO_2e/yr)

Since the project activity is a hydroelectric power plant project and does not involve the integration of a BESS, $PE_{FF,y}$, $PE_{GP,y}$ and $PE_{BESS,y}$ is not applicable. $PE_{HP,y}$ is the only parameter that needs to be considered to calculate Project Emissions. Therefore, Power Density of the project is calculated as follows:

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

where:

PD = Power density of the project activity (W/m^2),

Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W),

Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero,

A_{PJ} = Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2),

A_{BL} = Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.

If the power density of the project activity using equation above is greater than 4 W/m^2 and less than or equal to 10 W/m^2, then $PE_{HP, y}$ is calculated as follows:

$$PE_{HP,y} = \frac{EF_{Res} \, x \, TEG_y}{1000}$$

Leakage Emissions

In accordance with the ACM0002 (Version 21.0), leakage is neglected since the project is a new power plant.

8.1.1 Baseline emissions

The baseline emissions are to be calculated as follows:

$$BEy = EG_{PJ,y} \times EF_{grid,CM,y} \qquad \text{Equation (1)}$$

where;

BE_y = Baseline Emissions in year y (tCO_2e)

$EG_{PJ,y}$ = 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)

Projects estimated annual baseline emission reduction is calculated as follows:

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

$= 1,193,170 \times 0.5552$
$= 662,447\ tCO_2e$ / year

8.1.2 Project emissions

According to ACM0002 v21.0, Project Emissions are calculated based on the following formula:

$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} + PE_{BESS,y}$

where:

PE_y = Project emissions in year y (tCO_2/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of noncondensable gases in year y (tCO_2e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

$PE_{BESS,y}$ = Project emissions from charging of a BESS using electricity from the grid or from fossil fuel electricity generators (tCO_2e/yr)

Since the project activity is a hydroelectric power plant project and does not involve the integration of a BESS, $PE_{FF,y}$, $PE_{GP,y}$ and $PE_{BESS,y}$ is not applicable. $PE_{HP,y}$ is the only parameter that needs to be considered to calculate Project Emissions. Therefore, Power Density of the project is calculated as follows:

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

where:

PD = Power density of the project activity (W/m^2),

Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W),

Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero,

A_{PJ} = Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2),

A_{BL} = Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.

If the power density of the project activity using equation above is greater than 4 W/m^2 and less than or equal to 10 W/m^2, then $PE_{HP, y}$ is calculated as follows:

$$PE_{HP,y} = \frac{EF_{Res} \, x \, TEG_y}{1000}$$

PD = (500,000,000– 0) / (15,100,000[31] - 0) = 33.11W/m^2

Since the power density of the project is greater than 10 W/m^2, project emissions are considered as 0.

8.1.3 Leakage

In accordance with the ACM0002 (Version 21.0), leakage is neglected since the project is a new power plant.

[31] Reservoir area at maximum water level - Feasibility Report

8.2 Quantification of Net-GHG emissions and/or removals

According to ACM0002 v21.0 methodology, emission reductions related to project activities is estimated asfollows:

$$ER_y = BE_y - PE_y$$

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)

$ER_y = BE_y - PE_y$ Equation (2)

$ER_y = 662,447 - 0$

$ER_y = 662,447\ tCO_2$

Table 5: Aggregated GHG Emission Mitigations

Year	Baseline emissions (tCO_2e)	Project emissions (tCO_2e)	Estimated leakage (tCO_2e)	Reductions (tCO_2e)	Removals (tCO_2e)	Total GHG emission mitigations (tCO_2e)
12/03/2020 - 31/12/2020	535,403	0	0	535,403	0	535,403
01/01/2021 - 31/12/2021	662,447	0	0	662,447	0	662,447
01/01/2022 - 31/12/2022	662,447	0	0	662,447	0	662,447
01/01/2023 - 31/12/2023	662,447	0	0	662,447	0	662,447
01/01/2024 - 31/12/2024	662,447	0	0	662,447	0	662,447
01/01/2025 - 31/12/2025	662,447	0	0	662,447	0	662,447
01/01/2026 - 31/12/2026	662,447	0	0	662,447	0	662,447

01/01/2027 - 31/12/2027	662,447	0	0	662,447	0	662,447
01/01/2028 - 31/12/2028	662,447	0	0	662,447	0	662,447
01/01/2029 - 31/12/2029	662,447	0	0	662,447	0	662,447
01/01/2030 - 11/03/2030	127,044	0	0	127,044	0	127,044
Total	**6,624,470**	**0**	**0**	**6,624,470**	**0**	**6,624,470**
Annual average	**662,447**	**0**	**0**	**662,447**	**0**	**662,447**

8.3 Risk assessment for permanence

Any operational risks have been minimized by adhering to relevant laws and regulations and applying routine maintenance activities.

Permanence risk (%)	0

9. Management of data quality

The amount of emission reduction that the project activity will provide will be determined by using the electricity supplied by the power plant to the grid and the emission factor data calculated by the Turkish Ministry of Energy and Natural Resources.

The electricity produced in the power plant is measured by the meters whose information is given in Section 10. The calibration, maintenance and intervention authority of these meters belongs to the relevant distribution company.

The electricity generated in the power plant is measured by the meters whose information is given in Section 10. The calibration, maintenance and intervention authority of these meters belongs to the relevant distribution company. According to the methodology applied, the electricity supplied to the national grid by the project and the electricity consumed by the project activity shall be monitored. The net electricity is the difference between the electricity supplied and consumed by the project and shall be taken into account for emission reduction calculations.

Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems' [32](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 2 years.’ Therefore, periodic calibration of the meters will be done every 2 years according to the regulation.

[32] https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5

There is a main meter and a backup meter for each unit. These meters are constantly cross-checked to determine whether there is a problem with the meters. Reading a different value on the meters means that there is an error in one of the two meters, and in this case, the distribution company comes to the switchboard site and calibrates the meters.

Electricity production of licensed power plants can be followed from transparency platform of EXIST[33]. Also, the meter readings are checked periodically by the O&M Head and discussed thoroughly with the supervisor. The readings of the meters are also stored by the project proponent company for at least 2 years.

Since the electricity generated in the power plant will be monitored through official records and the emission factor to be used in emission reduction calculations is officially shared by the Ministry, there will be no uncertainty in emission reductions. The fact that the monitoring will be carried out on official data will ensure high data quality.

Data is stored electronically, during the crediting period and at least two years after the last issuance of credits for the project activity in the concerning crediting period. The project proponent is responsible for storage of data received from the measuring devices. The site manager is responsible for data aggregation.

[33] https://seffaflik.epias.com.tr/home

10. Monitoring

10.1 Monitoring plan

The necessary monitoring plan procedure has been established in order to measure the real calculable emission value of the project.

Net electricity generation is measured and recorded via meters sealed by TEIAS for billing purposes. Therefore, no additional monitoring plan is needed for monitoring emission reduction.

Net generation data collected during crediting period will be submitted to "Profed Enerji Çevre Dan. San. ve Tic. Ltd. Şti." for calculation of real emission reductions. Net generation data will be used for monitoring report to determine the production of the project activity.

Team	Responsibilities
O&M Head	• Reviewing and keeping data of monthly and annual generation statistics • Evaluating the GHG performance of the project activity
The plant manager	• Responsible for the operation of the plant and complying with the ACC monitoring plan • Ensuring calibration of monitoring Equipment • To ensure that the wastes generated in the field are disposed of in accordance with the laws and regulations. • Addressing grievance related to project activity
Project Representative	• Calculating the emission reductions • Preparing the monitoring report • Carry out the verification process

Data Measurement

The measurement of electricity generated from project activity is to be measured continuously using meters in site areas. Meter readings are taken by the O&M team through a system called OSOS (Otomatik Sayaç Okuma Sistemi/Automatic meter reading system). Monthly readings of the meter are taken by project proponent officials based on which the monthly invoices are raised. The invoices can be used for cross-checking the meter readings.

As shown in Section 7 Figure 5, Aşağı Kaleköy SPP is connected to the grid from the meter of the 4th unit of Aşağı Kaleköy HPP. Therefore, the generation value read on the meter connected to Unit-4 gives the electricity value generated by both the 4th unit of the Aşağı Kaleköy HPP and the electricity generated by the Aşağı Kaleköy SPP. In addition, there is a separate sub-meter connected to Aşağı Kaleköy SPP. The calibration of this sub-meter is carried out by TEİAŞ, just like other meters. Every year, TEIAS sends an official letter stating the value read from this meter, that is, how much electricity the Aşağı Kaleköy SPP has generated. The net electricity generated by the Aşağı Kaleköy

HPP is found by subtracting the value read on the sub-meter of the Aşağı Kaleköy SPP from the values read on the meters connected to the 4 units.

Data collection and archiving

The meter readings are checked periodically by the O&M Head and discussed thoroughly with the supervisor. The readings of the meters, which are monitored through the OSOS system, are stored by the project proponent company for at least 2 years.

Emergency preparedness

The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

Instructions are laid out and followed diligently by employees while operating the hydro power plant.

Besides these, Safety and Security Procedures have been established in accordance with internal policies.

Employee Trainings

According to the "Regulation on the Procedures and Principles of Employee's OHS Training"[34], OHS training should be provided at least once a year in workplaces classified as very dangerous. Since the hydroelectric power plant is within the scope of "very dangerous workplace class", it is mandatory for the project proponent to provide OHS training to its employees every year. In addition to OHS trainings, the project proponent provided job-related training for the employees whenever necessary. Certificates of the trainings will be stored electronically during the operation period.

The installation and operation of the meters were carried out according to the regulations of TEİAŞ (Turkish Electricity Transmission Corporation). Two calibrated meters, one main and one backup, are used for monitoring the electricity production of the power plant. While the main meter used to read how much electricity is generated, backup meter used for comparison only. Data from metering devices is recorded by TEİAŞ monthly.

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 2 years.' Therefore, periodic calibration of the meters will be done every 2 years according to the regulation.

The meters should comply with EMRA (Energy Market Regulatory Authority) regulations which define the accuracy class of the meters as 0.2 or 0.5 depending on the capacity of the circuit (0.5 in this project). EPIAS (EXIST - Energy Exchange Istanbul) records will be taken into consideration

[34] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=18371&MevzuatTur=7&MevzuatTertip=5

while calculating net electricity generation by the plant. ISVM (Electricity fed to the grid) and UECM (Electricity consumed from the grid) data given in the EPIAS records will be used for emission reduction calculations. Meters at the site will be used for crosscheck.

All data is kept for at least two years after the end of crediting period or two years after the last issuance whichever is later for QA/QC purposes.

Technical information of the meters can be seen in the table below:

Table 6. Technical Information of the Meters

Meter	Type	Accuracy	Serial Number
Unit 1 – Main Meter	EMH-LZQJ-XC	0.5S	7019894
Unit 1 – Backup Meter	EMH-LZQJ-XC	0.5S	7019895
Unit 2 – Main Meter	EMH-LZQJ-XC	0.5S	7019896
Unit 2 – Backup Meter	EMH-LZQJ-XC	0.5S	7019897
Unit 3 – Main Meter	EMH-LZQJ-XC	0.5S	7019898
Unit 3 – Backup Meter	EMH-LZQJ-XC	0.5S	7019899
Unit 4 – Main Meter	EMH-LZQJ-XC	0.5S	7019900
Unit 4 – Backup Meter	EMH-LZQJ-XC	0.5S	7019901
Aşağı Kaleköy SPP – Sub-Meter	Manas/Itron/SL700	Class 2 (± 2% Accuracy)	84260302

10.2 Data and parameters remaining constant

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2 / MWh
Description	Combined Margin Emission Factor of the Turkish National Grid. It's been published by Turkish Ministry of Energy and Natural Sources for 2020 on 20/09/2022
Origin of data	Turkish Ministry of Energy and Natural Sources. See: https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Bform2020.pdf
Value applied	0.5552
Justification of choice of data or description of measurement methods and procedures applied	Official data published by Host Country's Ministry of Energy and Natural Sources.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage

Comments	To demonstrate project activity's the contribution to SDG 13

Data / Parameter	**$EF_{grid,BM,y}$**
Unit	tCO_2 / MWh
Description	Build Margin Emission Factor of the Turkish National Grid. It's been published by Turkish Ministry of Energy and Natural Sources for 2020 on 20/09/2022
Origin of data	Turkish Ministry of Energy and Natural Sources. See: https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Bform2020.pdf
Value applied	0.3680
Justification of choice of data or description of measurement methods and procedures applied	Official data published by Host Country's Ministry of Energy and Natural Sources.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	To demonstrate project activity's the contribution to SDG 13

Data / Parameter	**$EF_{grid,OM,y}$**
Unit	tCO_2 / MWh
Description	Operating Margin Emission Factor of the Turkish National Grid. It's been published by Turkish Ministry of Energy and Natural Sources for 2020 on 20/09/2022
Origin of data	Turkish Ministry of Energy and Natural Sources. See: https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/Bform2020.pdf
Value applied	0.7424
Justification of choice of data or description of measurement methods and procedures applied	Official data published by Host Country's Ministry of Energy and Natural Sources.
Purpose of Monitoring	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Comments	To demonstrate project activity's the contribution to SDG 13

10.3 Data and parameters monitored

Table 7. Data and parameters to be monitored

Data / Parameter	$EG_{PJ,y}$ (SDG7)
Unit	MWh/year
Description	Quantity of the net electricity generation supplied to the grid by the project in year y
Origin of data	Direct Measurement
Value applied	The annual electricity fed to the grid is estimated as 1,193,170 MWh as indicated in generation license
Justification of choice of data or description of measurement methods and procedures applied	The net electricity value supplied to the grid is continuously measured by on-site power meters and recorded monthly. EPİAŞ (which is an association of TEİAŞ) records provide the exact electricity value delivered to the grid. These values are cross-checked with the on-site meter records. The generation data is recorded by two metering devices continuously. ISVM (Electricity fed to the grid) and UECM (Electricity consumed from the grid) are measured. Net generation is calculated by substracting UECM from ISVM.
Monitoring frequency	Monthly
Purpose of data	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	According to the Article 2 of the Communiqué of Meters in Electricity Sector[35] : '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. Also, according to Article 11 of this Communiqué, meters shall be in class of 0.5s, which means error interval for measuring is in +-0.5% range which is well acceptable according to rules. Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems'[36] (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 according to the regulation. Initial calibrations of the electricity meters are done by the distribution company, then distribution company will sole authority to do periodic calibration of the electricity meters as per the regulations. Apart from this, if an inconsistency is

[35] https://www.epdk.gov.tr/Detay/DownloadDocument?id=+6B2PMv4N4A=

[36] https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5

	noticed in the main and backup meters, calibration is performed by the distribution company in order to eliminate this inconsistency. Pursuant to the second paragraph of Article 11 of the "Communiqué on meters to be used in the Electricity Market" published in the Official Gazette by EMRA (Energy Market Regulatory Authority), on April 22, 2011The reason for this obligation, which meter is used in which situation and its provisions are stated as follows in article 6 (page 4) of the Agreement on Connection to the Distribution System for Unlicensed Electricity Producers implemented by EMRA. 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.
Comments	-

Data / Parameter	**Quantitative Employment (SDG 8)**
Unit	Number of Employment
Description	The project activity increases rural welfare by employing local people.
Origin of data	Employment Records
Value applied	116 people are employed in project site. 46 of these employees were employed from the area where the power plant is located, and 32 from the surrounding provinces of Bingöl province, where the power plant is located.
Justification of choice of data or description of measurement methods and procedures applied	Checking the employment records to confirm the number of employment.
Monitoring frequency	Annually
Purpose of data	To assess to contribution to SDG8.
Quality assurance and control	N/A
Comments	-

Data / Parameter	**CO_2 Emissions (SDG 13)**
Unit	tCO_2 / year
Description	Reduction of CO2 emissions due to implementation of the project activity

Origin of data	Yearly generation of Aşağı Kaleköy HPP and the emission factor of the Turkish National Grid.
Value applied	662,447 tCO_2e / year
Justification of choice of data or description of measurement methods and procedures applied	The net electricity value supplied to the grid is continuously measured by on-site power meters and recorded monthly by EPIAŞ and will be kept by the project proponent.
Monitoring frequency	Each monitoring period.
Purpose of data	☒ Calculation of baseline emissions ☐ Calculation of project emissions ☐ Calculation of leakage
Quality assurance and control	Backup meters are used for crosschecking the accuracy and both meters are calibrated if required. In addition, periodic calibrations of the meters are done every two years.
Comments	N/A

Appendix I – Evidence of Ownership

EPDK

T.C. ENERJİ PİYASASI
DÜZENLEME KURUMU

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi
Yenilenebilir Enerji Kaynağı kullanmaktadır.
(5346 Sayılı Kanunda yer alan, "Bu Kanun kapsamındaki yenilenebilir enerji kaynakları" tanımı çerçevesinde olan birleşik yenilenebilir elektrik üretim tesisleri için)

Lisans No : EÜ/5017-2/03126

Tarih : 21/05/2014

Bu lisans, **Kalehan Genç Enerji Üretim A.Ş**'ye, Bingöl ilinde kurulması planlanan **Aşağı Kaleköy Barajı ve HES** adındaki birden çok kaynaklı elektrik üretim tesisinde 21/05/2014 tarihinden itibaren 42 yıl, 3 ay, 16 gün süreyle, üretim faaliyeti göstermek üzere 6446 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 21/05/2014 tarihli ve 5017-2 sayılı Kararı ile verilmiştir.

(Bu lisans, Kalehan Enerji Üretim ve Tic. A.Ş'ye verilmiş olan 06/07/2011 tarihli ve EÜ/3308-18/2108 numaralı üretim lisansı sona erdirilerek, eskisinin devamı mahiyetinde verilmiştir.)

Mustafa YILMAZ
Başkan