ASLANCIK HYDRO POWER PLANT PROJECT

Aslancık Elektrik Üretim A.Ş. (as Project Owner)

Life İklim ve Enerji Ltd. Şti. (as Carbon Consultant)

Project title	Aslancık Hydro Power Plant Project
Project ID	917
Monitoring period	01-May-2022 to 07-Mar-2024
Crediting period	08-Mar-2024 to 07-Mar-2034
Original date of issue	04-Jun-2024
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Version	04
VCS Standard Version	4.7
Prepared by	Aslancık Elektrik Üretim A.Ş. & Life İklim ve Enerji Ltd. Şti.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Aslancık Hydro Power Plant Project (herein referred to as Aslancık HEPP in short) is a run-of-river dam-based hydro power plant project developed by Aslancık Elektrik Üretim A.Ş. (referred to as the "project proponent" from here on). The project has an installed capacity of 120MWm/98 MWe, which annually feeds emission free electricity into the national grid in Türkiye. Aslancık HPP displaces electricity from the current generation mix, which is based to a large amount on thermal power plants and affects the planned capacity extension of the electricity system.

Aslancık HPP generates electricity and feeds it into the national Turkish grid by using the renewable energy source of the current of Harşit Creek, which arises from Cimli, Karakaban and Kostan mountains in the surrounding of the town of Gümüşhane in the district and province of the same name. The watercourse passes the town of Torul in the district of the same name in Gümüşhane province, and then flows through Kürtün district. The Aslancık dam axis is located some 1.5 km North of the town of Doğankent. The energy tunnel stretches over a distance of some 13 km alongside the Harşit Creek watercourse, ending in the power plant which is located some 1.5 km East of the village of Soğukpınar. It is a run of river dam-based project.

Aslancık HPP comprises a barrage and reservoir, a diversion structure, an energy tunnel and penstock and the powerhouse with the electro-mechanic equipment. The power generation is achieved by installing and operating a run-of-river HPP comprising 2 Vertical Francis turbines with a rated capacity of 60 MWm/49MWe each. The installed capacity totals 120 MWm/98 MWe only because this is the maximum use of the turbine combination. The estimated annual electricity production is 428,624 MWh/yr. Further details on project technology are provided in the table below.

Aslancık HPP produces GHG emission free, clean electricity, which is fed into the national Turkish grid. All Turkish power plants are connected to this grid and are dispatched centrally by the Turkish grid operator Türkiye Elektrik İletim A.Ş (TEİAŞ) and its Enerji Piyasaları İşletme A.Ş. (EPİAŞ) (Energy Exchange Istanbul - EXIST). The electricity supplied to the national grid is dominated by thermal power plants. As Aslancık HPP is a run-of-river HPP, the electricity amount supplied to the grid depends on external physical conditions, i.e., the flow rate at Harşit Creek, though it is regulated to a certain extent by an appropriate management of the planned reservoir. In contrast, the thermal power plants connected to the national grid can fully be regulated.

Table 1 Technical data

HYDROLOGY		
Precipitation area: 3,109 km²	**Long term average flow at the dam/barrage:** 45.11 m³/s -1,420.57 hm³/a	
RESERVOIR		
Maximum (minimum) operating water altitude/level: 183m (180m)		
Total storage volume: 1.636 hm³	**Lake area:** 0.175 km²	
BULKHEAD/COFFERDAM AND DIVERSION		
Altitude of the upstream (downstream) cofferdam: 176m (166m)		
Dimensions of the diversion channel: 12m · 7m	**Length:** 330m	
DAM/BARRAGE		
Type: Concrete weight	**Crest elevation:** 185m	**Thalweg elevation:** 165m
Height from thalweg/Dam height: 20m	**Height from foundation:** 29m	
WATER INTAKE STRUCTURE		
Control: Rolling cofferdam cover	**Invert elevation:** 171m	
Dimension of the clear aperture: 2 · 5.5m · 12m	**Limit of submergence:** 3.5m – 6.5m	
GRAVEL PASS		
Type: Orifice radial cover	**Invert elevation:** 165m	**Dimensions of the radial covers:** 6m · 2.95m
SPILLWAY/OVERFALL		
Location and type: on the stem, radial cover, frontal acceptance		
Number of radial covers: 3	**Dimensions of the radial covers:** 13.3m · 15.12m	
ENERGY TUNNEL		
Type: Reverse-U Cross section (modified horseshoe), concrete coated		
Tunnel inside diameter: 5.5m	**Tunnel length (up to steel coating):** 12,907m	
Length and diameter of the Steel coated tunnel: 160m / 4.5m circular		
VALVE CHAMBER		
Type: On the place	**Dimensions:** 18.5m · 8m	**Equipment:** 1 · 4,500mm butterfly valve
SURGE CHAMBER		
Type: Vertical cylindrical shaft	**Shaft diameter:** 22m	**Top of shaft elevation:** 205m
Shaft altitude: 50m	**Maximum water level:** 200m	**Minimum water level:** 155.5m
PENSTOCK		
Diameter: 4,500mm	**Length:** 238m	**Bifurcation area:** 3,200mm (diameter) / 2 · 18=36m (length)
POWER HOUSE		
Type: Half	**Number of units:** 2	**Nominal/Rated installed capacity:** 2 · 60 MW

submerged		
Turbine: Vertical Francis	**Maximum gross head:** 134.5m	**Unit discharge/flow rate:** 51.1m³/s
Dimensions: 36.8m · 17m	**Altitude (max.):** 39.8m	**Elevation of Environment:** 58m
SWITCHYARD		
Type: Open-air switchyard	**Operating voltage:** 13.8/154 kV	**Dimensions :** 42m · 81m
Energy transmission line: 1272 MCM / Length 11.4km / End at TEİAŞ' Tirebolu Substation		

The project also includes a fish passage, which has a base slope of 15% and clear width of 1.20 meters. Minimum flow of water is also maintained and measured continuously.

Concluding, the electricity produced by Aslancık HPP displaces power generation by thermal power plants, which leads to savings in fuel combustion and thus to the reduction of GHG emissions, as specified and explained in detail in Section 5.

For the third monitoring period, which corresponds to the period between 01-May-2022 and 07-Mar-2024, the net electricity generation for Aslancık HPP has been recorded as 563,847.46MWh. In line with this net generation, the actual emission reduction has been calculated as 300,527 t CO_2e. The table below includes the differences in the estimated and actual achieved emission reductions. Technical description of installed technology and equipment is given in the table below.

Table 2 Estimated and actual reduction comparison

Vintage		actual ERy (tCO_2e)	estimated ERy (tCO_2e)	% by year
01-May-2022	31-Dec-2022	102,735	149,607	-31%
01-Jan-2023	31-Dec-2023	162,545	222,884	-27%
01-Jan-2024	07-Mar-2024	35,247	40,913	-14%
Total		300,527	413,404	-27%

As aforementioned above, Aslancık HPP is a run-of-river HPP, the electricity amount supplied to the grid depends on external physical conditions, i.e., the flow rate. That is why, actual emission reduction amounts are lower than estimated amount since electricity generated is also lower than the estimated amount of electricity. Within the scope of this project reservoir area whose detailed data are given in Table 1 was formed for the installation of the plant. Further Technical description of installed technology and equipment is given in the table below.

Table 3 Technical description of Aslancık HPP's installed technology and equipment [1]

[1] Provisional acceptance certificate for Power-up.

Equipment	Specifications
Hydraulic Turbine- 1 & Hydraulic Turbine-2	Vertical Axis Francis Turbine(RAINBOW) Output Power: 60 MWm/49 MWe Head:127 m Flow Rate: 51.1 m^3/s Velocity: 333,3r/min Serial Numbers of Turbine 1 and Turbine 2: 3977
Generator-1 & Generator-2	Producer Firm: KONCAR Type: S 5186-18 Phase No/Frequency: 3/50 Hz Serial Number Generator 1: 24406 Serial Number Generator 1: 24407 Nominal Power: 66,66 MVA Velocity: Velocity: 333,3r/min Power Factor:0.9 Excitation Voltage:187 V Excitation Current:786 A

Aslancık A.Ş. operates the HPP as Independent Power Producer (IPP) and has obtained the respective production license from the Turkish Energy Market Regulatory Authority (EPDK) on 20-Mar-2008. The commissioning date for the project is 08-March-2014 and started operations with an installed capacity of 93 MWe. However, on 18-Dec-2017, its capacity was increased from 93 MWe to 98 MWe. The Provisional Acceptance Certificate for the new installed capacity was approved on the same date, 18-Dec-2017. The plant was in continued operation during monitoring period i.e. 01-May-2022 to 07-Mar-2024.

Project Deviation*:* Two parameters, APJ and CapPJ have been added to the second monitoring period. These parameters had not been included in the registered PD and the MR of the first monitoring period. However, as per requirements of the applied methodology ACM0002 Version 12.3 (during the first crediting period) and Version 22 (during the second crediting period), these parameters are added during the second monitoring period and will be monitored for the remaining crediting periods. Secondly, the reservoir area that was included for project emission calculations in the registered PD was retrieved from the feasibility report. However, when the project was actualized, the reservoir area had been constructed to be less than what was

calculated in the feasibility report. The project's reservoir area is about 160,000 m^2. The area of the reservoir is measured when the reservoir is full.

During the first monitoring period, the project went for a capacity increase and added 5 MWe of power to its installed capacity. On 18-Dec-2017 the plant's capacity was increased from 93 MWe to 98 MWe. After this capacity increase, renewable electricity generation amount still occurred and occurs lower than estimated electricity generation amount in registered PD. For this reason, the project is still additional. In registered PD, the start date of the crediting period was given as the expected date of commissioning, i.e., 01-Oct-2013. However, project got its provisional acceptance protocol on 07-Mar-2014 and started operating on 08-Mar-2014. Therefore, start date of the first crediting period was taken as 08-Mar-2014. Furthermore, the regulation that arranged the frequency of measuring instruments' calibration was revised. According to the revised regulation, the calibration frequency is 10 years, whereas it was 5 years in the previous version. In addition, TEİAŞ also has an internal procedure in which they test the meters in every two years, however this is not based on regulation but per the system usage agreement with the project owner.[2]

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation	(01-Oct-2013--30-Sep-2023)	VCS	TÜV Rheinland	10 years
1st Verification	(08-Mar-2014--31-Dec-2019)	VCS	Re Carbon Gözetim Denetim ve Belgelendirme Ltd. Şti.	5 years, 9 months, 24 days
2nd Verification	(01-Jan-2020--30-Apr-2022)	VCS	Carbon Check (India) Private Ltd.	2 years, 4 months
Joint Validation Verification	Validation: 08-Mar-2024 to 07-Mar-2034 Verification: 01-May-2022 to 07-Mar-2024	VCS	Applus	10 years for Crediting Period Renewal & 1 year 10 months for Verification

1.3 Sectoral Scope and Project Type

[2] TEİAŞ System Usage Agreement, p. 12

The project is a large-scale one that involves electricity generation from renewable sources; therefore, it is categorized in the sectoral scope 1 "Energy Industry – Renewable -/Non-renewable Sources" according to the UNFCCC definition. [3] The project consists of a dam and a hydroelectric power plant; it is not a part of a grouped project.

Sectoral scope[4]	1 "Energy Industry – Renewable -/Non-renewable Sources
Project activity type	Large scale hydropower project

Sectoral scope	This section is not applicable because this project is not an AFOLU project.
AFOLU project category[5]	The project is not an AFOLU project.
Project activity type	The project is not an AFOLU project.

1.4 Project Eligibility

1.4.1 General eligibility

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

The project includes a single location and installation only and the project activity is not a grouped project activity.

The project applies Verra approved CDM methodology ACM002 Version 22. The project activity results in displacement of electricity from thermal power stations while contributing to sustainable development of Türkiye. Hence, the project contributes to Verra's Vision and Mission.

Aslancık HPP has an installed capacity of 98 MWe only, because this is the maximum use of the turbine combination. It started its operation with an installed capacity of 93 MWe on 08-Mar-2014. However, on 18-Dec-2017, its capacity was increased from 93 MWe to 98 MWe. Provisional Acceptance Certificate for the new installed capacity was approved on 18-Dec-2017. After this capacity increase, renewable electricity generation amount still occurred/occurs lower than estimated electricity generation amount in registered PD. It is not a fragmented part of a larger project activity or activity that would otherwise exceed the capacity limit. The project is eligible

[3] See https://cdm.unfccc.int/DOE/scopes.html

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

[5] *See Appendix 1 of the* VCS Standard

under VCS Standard Version 3 and remain eligible under VCS Standard Version 4.7 and its variations, as it was registered before 31-Dec-2019.[6]

1.4.2 AFOLU project eligibility

This is not an AFOLU project.

1.4.3 Transfer project eligibility

This is not a transfer project.

1.5 Project Design

☒ Single location or installation

☐ Multiple locations or project activity instances (but not a grouped project)

☐ Grouped project

Grouped Project Design

This project is not a grouped project.

1.6 Project Proponent

Organization name	Aslancık Elektrik Üretim A.Ş.
Contact person	Suat Odaman
Title	Project Representative
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Email	info@aslancikelektrik.com.tr

1.7 Other Entities Involved in the Project

Organization name	Life İklim ve Enerji Ltd. Şti.
Role in the project	Project Developer

[6] https://verra.org/wp-content/uploads/2024/04/VCS-Standard-v4.7-FINAL-4.15.24.pdf , Page 77.

Contact person	Aslı Yağmur Özcan
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1.8 Ownership

Aslancık Elektrik Üretim A.Ş. holds all licences, permits and land use rights related to Aslancık HPP and has obtained and owns all equipment used for its implementation.

1.9 Project Start Date

Project start date	08-Mar-2014
Justification	According to VCS Standard Version 4.7, the project start date is defined as the "the date on which the project began generating GHG emission reductions or carbon dioxide removals."[7] or Aslancık HPP, this is the date of commissioning, i.e., 08-Mar-2014, see Table 17 in Section 4.1.

1.10 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☐ Ten years, fixed ☒ Other (In accordance with VCS Standard Version 3 rules, a 10 year, twice renewable crediting period is chosen for Aslancık HPP.[8] (The project remains eligible under VCS Version 4.7 as well)
Start and end date of first or fixed crediting period	08-Mar-2024 to 07-Mar-2034

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

[7] https://verra.org/wp-content/uploads/2024/04/VCS-Standard-v4.7-FINAL-4.15.24.pdf

[8] VCS Standard Version 3, Section 3.9, paragraph 3.9.1

☒ < 300,000 tCO_2e/year (project)

☐ ≥ 300,000 tCO_2e/year (large project)

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO_2e)
08-Mar-2024 to 31-Dec-2024	157,143
01-Jan-2025 to 31-De-2025	191,830
01-Jan-2026 to 31-Dec-2026	191,830
01-Jan-2027 to 31-Dec-2027	191,830
01-Jan-2028 to 31-Dec-2028	191,830
01-Jan-2029 to 31-Dec-2029	191,830
01-Jan-2030 to 31-Dec-2030	191,830
01-Jan-2031 to 31-Dec-2031	191,830
01-Jan-2032 to 31-Dec-2032	191,830
01-Jan-2033 to 31-Dec-2033	191,830
01-Jan2034 to 07-Mar-2034	34,687
Total estimated ERRs during the first or fixed crediting period	1,918,300
Total number of years	10
Average annual ERRs	191,830

1.12 Description of the Project Activity

Aslancık Hydro Power Plant Project is a 98 MWe large-scale run-of-river hydro power plant. It started commercial electricity production in 08-Mar-2014. Produced electricity is being fed into the national grid.

The project generates a substantial emission reduction by bringing carbon neutral electricity production to the Turkish grid. The hydro project shall be registered as a voluntary emission reduction project under the Voluntary Carbon Standard. The expected co-financing from carbon market proceeds has enabled the projects implementation.

The 120MWm/98 MWe Aslancık HPP produces electricity for transmission into the national grid. Aslancık HPP produces electricity and supplies it to Türkiye's national grid by harnessing the renewable energy from the flow of Harşit Creek. This creek originates from the Cimli, Karakaban, and Kostan mountains near the town of Gümüşhane, located in the district and province with the

same name. The creek flows through the town of Torul in Gümüşhane province and continues through Kürtün district. The Aslancık dam is situated approximately 1.5 km north of the town of Doğankent. The energy tunnel, which runs parallel to the Harşit Creek for about 13 km, terminates at the power plant located roughly 1.5 km east of the village of Soğukpınar. This project is based on a run-of-river dam system. The net annual electricity production of the project activity is expected to be 428,624 MWh/yr.

Aslancık HPP includes a dam and reservoir, a diversion structure, an energy tunnel, a penstock, and a powerhouse equipped with electro-mechanical machinery. The penstock is of 3.200 mm in diameter and 36 m in length transfers the water to the powerhouse where the water is used by two Francis turbines with a head of 127 m and a rated capacity of 60 MWm/49MWe each.

1.13 Project Location

Aslancık HPP is located in the Doğankent and Tirebolu districts of Türkiye's Giresun province in the Black Sea. The dam axis is located some 1.5-kilometers North of Doğankent. The energy tunnel stretches over a distance of some 13 kilometers alongside the Harşit Creek watercourse, ending in the power plant which is located some 1.5-kilometers East of Soğukpınar Village.

Figure 1 Location of Giresun province in Türkiye's Black Sea region

Figure 2 Doğankent and Tirebolu districts in Giresun province

Figure 3 Location of Aslancık HPP

Figure 4 Location of Tirebolu and Doğankent districts in Giresun province in Türkiye

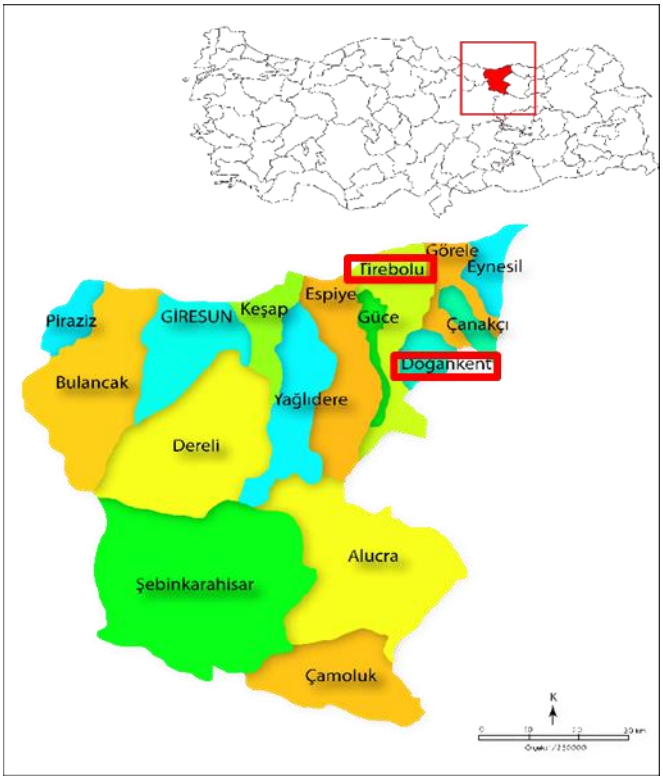


Figure 5 Location of Aslancık HPP project components

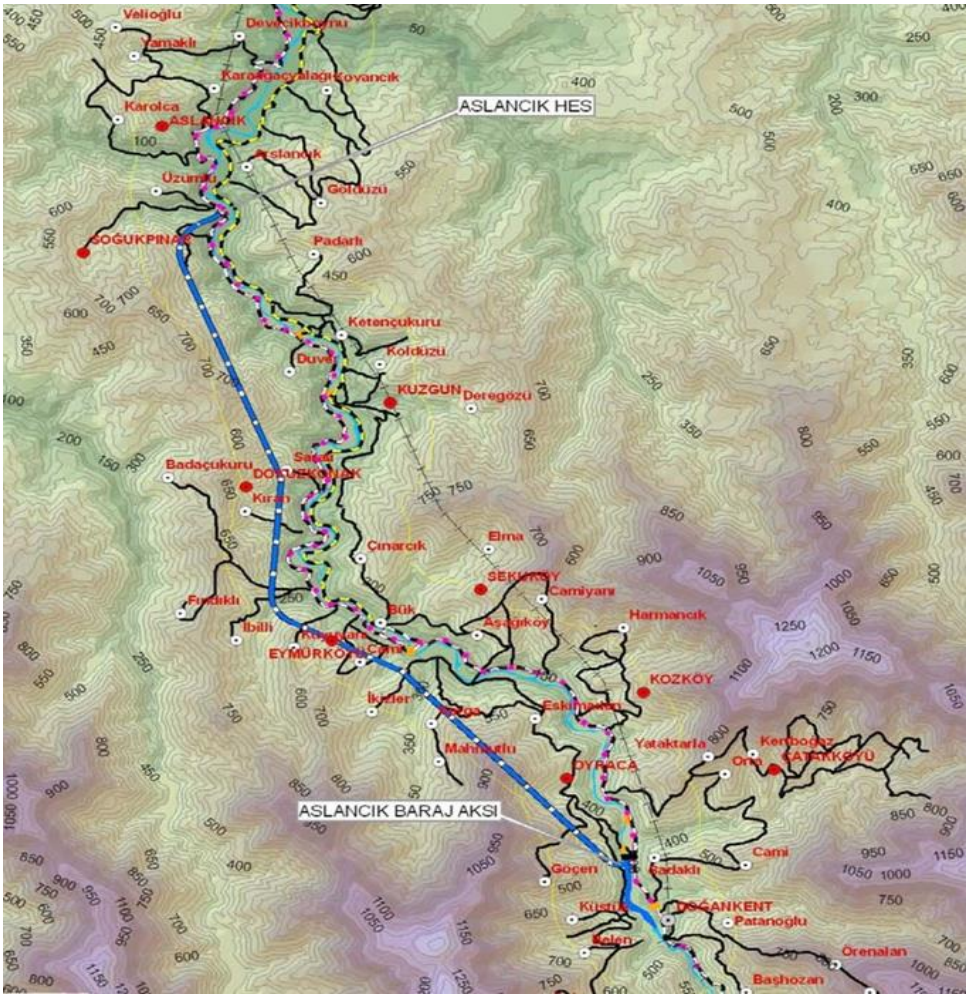


Table 4 Coordinates for Aslancık HPP project components [9]

Unit	Longitude (N)	Latitude (E)
Power House	40°54'36.30" N	38°50'47.72"E
Main dam	40°48'57.69" N	38°54'41.47" E
Switchyard	40°54'38.85" N	38°50'46.44" E

1.14 Conditions Prior to Project Initiation

The conditions prior to the implementation of the proposed project activity are characterised by the following distribution of primary energy resources used for electricity generation, as is displayed in Turkish electricity generation-transmission statistics 2010 published by TEİAŞ[10]:

Table 5 Türkiye's Gross Electricity Generation by Primary Energy Resources

[9] Please See "Project Coordinates"

[10] See "Türkiye Brüt Elektrik Enerjisi Üretiminin Üretici Kuruluşlar ve Birincil Enerji Kaynaklarına göre Yıllar İtibariyle Gelişimi (2006-2010) .xls" [TEİAŞ Statistics]

	Gross electricity generation (GWh)		
Primary Energy Resources	**2008**	**2009**	**2010**
Hard Coal+Imported Coal	15,857.50	16,595.60	19,104.30
Lignite	41,858.10	39,089.46	35,942.10
Coal Total	57,715.60	55,685.06	2,143.80
Fuel Oil	7,208.60	4,439.77	4.30
Diesel oil	266.30	345.81	0.00
LPG	0.00	0.40	31.90
Naphtha	43.60	17.56	98,143.70
Liquid Total	7,518.50	4,803.53	457.50
Natural Gas	98,685.30	96,094.71	55,380.10
Renewables and wastes	219.90	340.15	19,104.30
Thermal Total	164,139.30	156,923.44	35,942.10
Hydro+Geothermal+Wind Total	34,278.70	37,889.47	2,143.80
Total	**198,418.00**	**194,812.92**	**211,207.70**

The current generation mix is clearly dominated by fossil fuel fired power sources. The coal fired power plants serving the Turkish system are characterised by pulverized coal combustion technology with relatively low pressure and temperature. Typical thermal power plants are also characterised in Table 6 below.

Table 6 Thermal Power Plants in Türkiye[11]

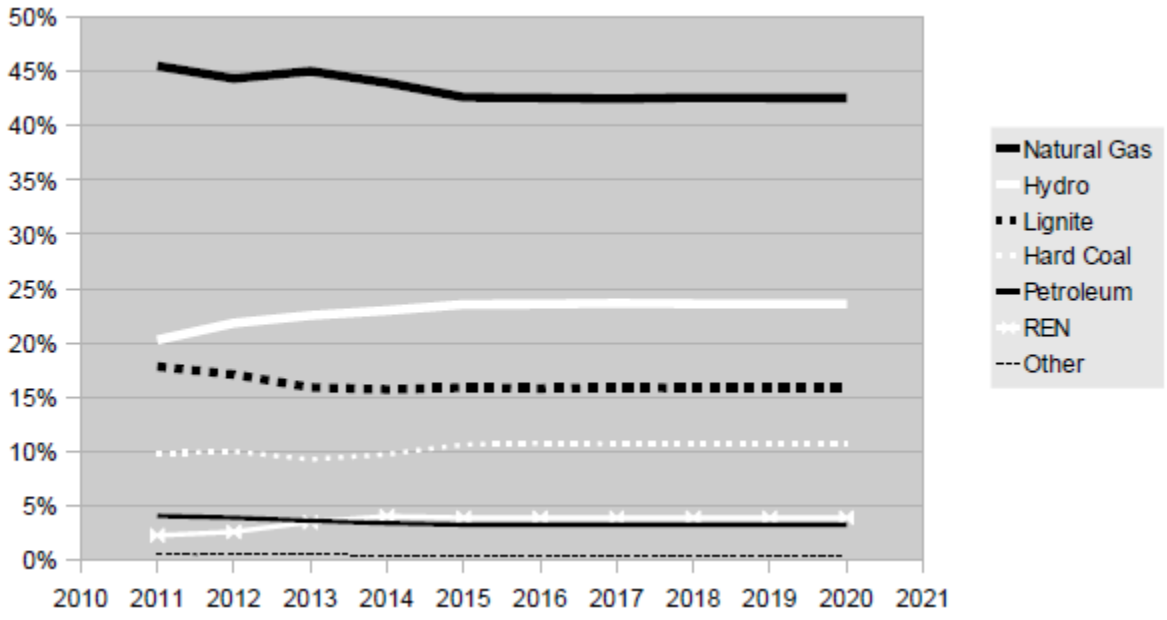
Power plant name	Fuel type	Province	Total capacity (MW)	Projected generation (GWh)	Average thermal efficiency (%)
Afşin-Elbistan A	Lignite	K.Maraş	1,360.00	8,840.00	30.06
Aliağa GT+KÇ	Diesel oil	İzmir	180.00	540.00	33.78
Ambarlı	Fuel oil	İstanbul	630.00	4,100.00	37.25
Ambarlı KÇ	Natural Gas	İstanbul	1,350.90	8,780.00	48.57
Bursa	Natural Gas	Bursa	1,432.00	10,024.00	54.40
Çatalağzı B	Hard Coal	Zonguldak	300.00	1,950.00	33.57
Çayırhan 1,2	Linyit	Ankara	320.00	2,080.00	34.54
Denizli Tabii	Buhar	Denizli	17.50	105.00	11.57
Esenyurt I,II,III,IV	Natural Gas	İstanbul	188.50	1,413.80	45.00
Enron(Trakya Elek.)	Natural Gas	Tekirdağ	498.70	3,740.30	47.00
Engil GT	Diesel oil	Van	15.00	90.00	21.27
Hakkari	Fuel oil	Hakkari	11.10	83.30	35.03

[11] See Environmental Atlas of Turkey (Türkiye Çevre Atlası) 2004, p. 197.
https://cevresehiriklimkutuphanesi.csb.gov.tr/SourcePDF/8b6d5cda-3ac5-444c-842e-373882fddb2d

Hamitabat KÇ	Natural Gas	Kırklareli	1,200.00	7,800.00	45.81
Hopa	Fuel oil	Artvin	50.00	200.00	26.27
Kangal 1,2,3	Lignite	Sivas	457.00	2,970.50	29.76
Kemerköy 1,2,3	Lignite	Muğla	630.00	4,095.00	33.21
Orhaneli	Lignite	Bursa	210.00	1,365.00	36.18
Ova elektrik	Natural Gas	Kocaeli	258.40	1,938.00	44.00
Park Termik	Lignite	Ankara	300.00	1,072.90	34.71
PS3-Silopi	Fuel oil	Ş. Urfa	44.10	330.80	37.36
PS3A-idil	Fuel oil	Mardin	11.40	85.50	35.19
Seyitömer	Lignite	Kütahya	600.00	3,900.00	32.97
Soma A	Lignite	Manisa	44.00	290.00	30.31
Soma B	Lignite	Manisa	990.00	6,435.00	32.45
Tunçbilek A+B	Lignite	Kütahya	429.00	2,790.00	31.45
Unimar	Natural Gas	Tekirdağ	504.00	3,780.00	37.00
Van	Fuel oil	Van	24.00	180.00	39.33
Yatağan	Lignite	Muğla	630.00	4,100.00	32.67
Yeniköy	Lignite	Muğla	420.00	2,730.00	34.82

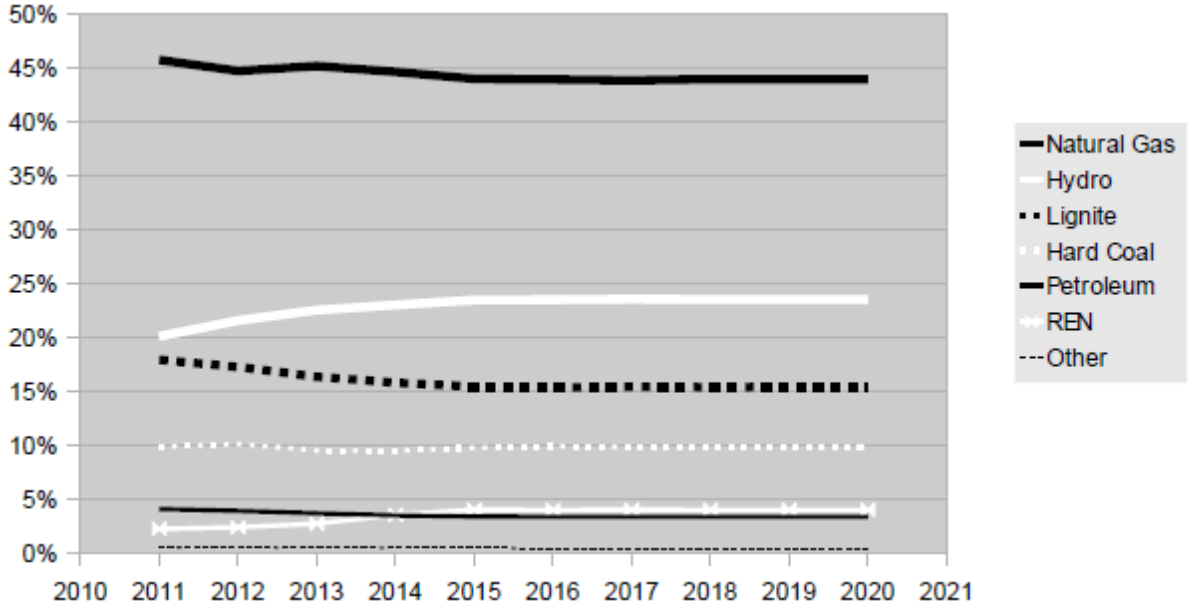
Current projections for system extension from [TEİAŞ Projection] are represented below:

Figure 6 Shares of energy resources in projected Turkish electricity generation 2011-2020 (scenario 1) [12]



[12] See TÜRKİYE ELEKTRİK ENERJİSİ 10 YILLIK ÜRETİM KAPASİTE PROJEKSİYONU (2012-2021)

Figure 7 Shares of energy resources in projected Turkish electricity generation 2011-2020 (scenario 2) [13]



As can be seen in both scenarios, electricity generation in Türkiye is clearly based on fossil fuels and is expected to remain so in the nearer future, with natural gas representing roughly 45%, hydroelectricity being about to stabilize at a level between 20% and 25%, emission intensive lignite keeping a share of around 15%, hard coal keeping a share of approx. 10%, and petroleum-based sources expected to stay below 5%. Renewable energy will increase its share significantly, but from a very low level, and is not expected to reach 5%.

The project boundary comprising the relevant emission sources which are affected by Aslancık HPP is the Turkish electricity system, see Figure 8 in Section 3.3. The project proponent has never in the past had any share of or control over the relevant emission sources. This demonstrates that no GHG emissions were primarily created by the project proponent for the purpose of subsequent removal. The project itself is GHG emission neutral.

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

Aslancık HPP is in compliance with all applicable laws and regulations such as

(1) Electricity Market Law[14]. (Law Number: 4628, ratified 20-Feb-2001, enacted 03-Mar-2001)

(2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity

[13] See TÜRKİYE ELEKTRİK ENERJİSİ 10 YILLIK ÜRETİM KAPASİTE PROJEKSİYONU (2012-2021)

[14] https://www.mevzuat.gov.tr/MevzuatMetin/1.5.4628.pdf

Energy [15] (Law Number: 5346, ratified 10-May-2005, enacted 18-May-2005)

(3) Environment Law[16] (Law Number: 2827, ratified 09-Aug-1983, enacted 11-Aug-1983)

The relevant evidence, such as grid connection agreement, land lease contracts, production licence, and relief from duty to perform EIA are available in Appendix 2.

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

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

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

Has the project registered under any other GHG programs?

☐ Yes ☒ No

Is the project active under the other program?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

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

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

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

☐ Yes ☒ No

1.17.2 No Double Claiming with Other Forms of Environmental Credit

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

[16] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=2872&MevzuatTur=1&MevzuatTertip=5

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

☐ Yes ☒ No

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☐ No

If yes:

Is the project proponent(s) or authorized representative a buyer or seller of the product(s) (goods or services) that are part of a supply chain?

☐ Yes ☐ No

If yes:

Has the project proponent(s) or authorized representative posted a public statement on their website saying, "Carbon credits may be issued through Verified Carbon Standard project [project ID] for the greenhouse gas emission reductions or removals associated with [project proponent or authorized representative organization name(s)] [name of product(s) whose emissions footprint is changed by the project activities]."

☐ Yes ☐ No

1.18 Sustainable Development Contributions

1.18.1 Sustainable Development Contributions Activity Description

Building a HPP contributes to a sustainable expansion path of the Turkish energy system, as it serves the steadily growing electricity demand in an environmentally suitable way. The project also contributes to dissemination of state-of-the-art new renewable energy (REN) technology. This helps strengthening those pillars of Turkish energy supply that are based on ecologically sound and domestically sourced technology.

No significant negative ecological impacts can be expected from the proposed project activity. Aslancık HPP has undergone a full environmental impact assessment (EIA) according to Turkish

law. The EIA Report[17] was submitted on 01-Feb-2008, leading to environmental approval of the project by Türkiye's Environment and Urbanization Ministry on 02-Apr-2008. [18]

In fact, there are essential positive environmental effects, as highly polluting electricity generation technologies is displaced by the project. Pollution not only comprises greenhouse gases but other local air pollutants such as SO2, NOx, or Particulate Matter, as well.

As for social impacts, significant positive employment effects occurred especially during the construction and installation period. Management, operation and maintenance of the HPP creates permanent jobs which require high qualification, contributing to capacity building and know-how dissemination in Türkiye. Moreover, since it is a renewable energy project, it contributes to achieve nationally stated sustainable development priorities which were indicated like in the law on use of renewable energy resources for electricity generation. Introduction purpose of this Law; the use of renewable energy resources for electrical energy generation to spread these resources to the economy in a reliable, economical and quality manner, decreasing greenhouse gas emissions, utilizing wastes, protecting the environment and developing the manufacturing sector needed to achieve these objectives. Moreover, sustainable development goals outcomes and the actual results of the contributed sustainable development indicators by the project during the monitoring period is given in the table given below.

1.18.2 Sustainable Development Contributions Activity Monitoring

As a renewable energy plant, the project contributes to 3 Sustainable Development Goals (SDGs) in the following ways:

• Displacing part of the grid electricity mainly generated by fossil fuel combustion, thus reducing the emission of CO_2 428,624 MWh /yr of electricity from clean and environmentally sound technologies. Thus, the project will achieve SDG 7 "Ensure Access to Affordable, Reliable, Sustainable and Modern Energy for All"

• This project will increase income of local residences and accelerate economy development in rural areas. 16 people have been employed. Thus, the project will achieve SDG 8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all".

• The project will achieve a GHG emission reduction of 191,830 tCO_2e/yr during the crediting period. Thus, the project will achieve SDG 13"Take urgent action to combat climate change and its impacts".

[17] Please see ÇED Olumlu Belgesi

[18] Please refer to the registered Project Design Document Section 5 for the EIA report's summary.

- The Aslancık Hydro Power Plant (HPP) project, with its run-of-river dam-based design, utilizes advanced hydroelectric technology to generate renewable energy and provide significant social, environmental, and economic iits in the Doğankent and Tirebolu districts of Türkiye's Giresun province. The project result in three key SGDs during the monitoring period from 01-May-2022 to 07-Mar-2024.

- The project achieves SDG 7 "Ensure Access to Affordable, Reliable, Sustainable and Modern Energy for All" by displacing part of the grid electricity mainly generated by fossil fuel combustion. During the monitoring period, the project provided 563,849 MWh of zero-emission electricity to the Turkish national grid. An estimated 4,286,240 MWh expected to be generated during the second crediting period.

  This project the project achieves SDG 8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all" by increasing the income of local residences and accelerating the economical development in rural areas. 16 people in total have been employed for the project.

  The project achieved a reduction of 300,527 tCO_2e during the monitoring period which comes under first crediting period and, the project will achieve a 1,918,300 tCO_2e of emission reductions during the second crediting period. Thus, the project will achieve SDG 13 "Take urgent action to combat climate change and its impacts".

- Türkiye has established several key priorities under its sustainable development framework, which are reflected in its national energy policies, economic development plans, and climate action strategies. Türkiye's "National Energy Efficiency Action Plan 2017-2023" and "National Renewable Energy Action Plan" prioritize increasing the share of renewable energy in the national energy mix. Türkiye's "11th Development Plan (2019-2023)" emphasizes promoting sustainable economic growth, increasing employment, and developing rural areas. The plan also highlights the importance of creating decent work opportunities, particularly in the renewable energy sector. Türkiye's "Climate Change Action Plan (2011-2023)" and "Intended Nationally Determined Contribution (INDC)" under the Paris Agreement emphasize reducing greenhouse gas (GHG) emissions and integrating climate change measures into national policies. The plan sets a target to reduce GHG emissions by up to 21% from the business-as-usual scenario by 2030. Renewable energy projects are not mandated or required by the State.

Table 7: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
Sequential row number	*SDG Target number*	*Number and text of SDG indicator or, if no official SDG indicator is applicable, user-defined indicator*	*Indicate the project's contribution to the SDG Indicator (implemented activities to increase or decrease)*	*Brief description of the quantifiable impact of the project's activities related to the SDG indicator, during the monitoring period.*	*Brief description of the cumulative quantifiable impact of the project's activities related to the SDG indicator, over the project lifetime.*
1)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	The project activity provides 98 MW installed capacity of renewable energy. It delivered 563,849 MWh zero-emission electricity to the national grid for the third monitoring period.	The project activity has been supplying clean renewable energy to the grid since 2014. The project owner has been complying with the targeted SDGs and the project's implementation is going on without any issues. Some 4,286,240 MWh of electricity is expected to be generated during the second crediting period. This renewable energy supply supports SDG Target 7.2, which aims to increase the share of renewable energy in the global energy mix.
2)	8.5	8.5.1 Average hourly earnings of employees, by sex, age, occupation and persons with disabilities	Implemented activities to increase	16 employees were provided employment during the monitoring.	Total 16 people will be employed throughout the project lifetime. This will help in fostering economic growth in the local community.

3)	13.2	13.2.2 Total greenhouse gas emissions per year	Implemented activities to increase	The project activity directly contributed to the targeted SDG by achieving 300,527 tCO_2e of emission reductions during the third monitoring period, through clean energy generation and displacing emission-intensive energy in the national grid.	The project owner operates the plant since 2014 and has been reducing emissions without any issue. 1,918,300 tCO_2e of emission reductions are expected to occur during the second crediting period. The project demonstrates consistent emission reductions since 2014 without any operational issues, ensuring sustained climate benefits.

1.19 Additional Information Relevant to the Project

Leakage Management

There is no leakage management as per applied methodology ACM0002 Version 22.

Commercially Sensitive Information

There is no commercially sensitive information.

Further Information

There is no further information.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	The local residents of the nearby, affected villages, i.e. Aslancık, Eymür, Doğankent, and Dokuzkonak. The main element of the stakeholder consultation was a physical meeting, conducted on 13-Dec-2007 in the assembly room of the Imam Hatip School in Doğankent, Giresun, with 80 participants. In addition to the meeting, a two-day opinion survey was conducted beforehand with the heads of the villages affected by the dam construction works. The purpose was to gather information on the socio-economic situation in the region and about the public opinion on the project.
Legal or customary tenure/access rights	For property rights, the project site has acquired property rights in line with the existing legislation and implemented the project. No issues were or are raised due to property rights to territories and resources held by stakeholders, Indigenous People, local communities, and customary rights. No Indigenous People were identified.
Stakeholder diversity and changes over time	The stakeholders have different levels of education and skills, and income levels may mary. The project has a positive impact on the economy of the stakeholders since it has created employment for the local people. However there no

	impact on the social, and cultural diversity within stakeholder groups.
Expected changes in well-being	Concerns about the project have been raised by the local population mainly with regard to • impacts of the penstock pipe on groundwater quality • locations of the access tunnels • storage location of excavation material • stability of the dam against the flow of the Harşit Creek • silting up of the reservoir area • sourcing of construction workers and start of construction works • depth of the dam lake • flooding of Sadaklı community.
Location of stakeholders	The stakeholders are the residents of the local villages nearby. The closest village is Aslancık village, which is 1.2 km away from the project site. Doğankent village is 16.9 km away, Eymür village is 13.1 km away and Dokuzkonak village is 10 km away.
Location of resources	The local villages nearby which are Aslancık village, Doğankent village, and Dokuzkonak village.

2.1.2 Stakeholder Consultation and Ongoing Communication

Date of stakeholder consultation	13-Dec-2007
Stakeholder engagement process	a) Invitations had been published in local, regional and national newspapers one week earlier for the stakeholder consultation that was conducted on 13-Dec-2007. Also, the heads of the affected villages, as well as the community, district and governor administrations had been invited to the meeting, and they had disseminated information on the meeting to the affected local public via public announcements and public notices. b) A grievance book was delivered to the Muhktar of the Aslancık village during the first monitoring period. Information was provided to the locals by

	the village head, regarding the whereabouts of the book. c) A grievance book was delivered to the Muhktar of the Aslancık village during the second monitoring period. Information was provided to the locals by the village head, regarding the whereabouts of the book.
Consultation outcome	a) During the meeting, the concerns were eliminated. Aslancık Elektrik Üretim A.Ş. explained the real potential impact of the project activity to the audience as simply and coherently as possible. A commitment to conduct appropriate mitigation measures was given, as well as to fully compensate any affected party for any unavoidable negative impacts. Also, the local sourcing of construction workers was agreed upon. The meeting resulted in a positive assessment of and in favor of the project by the local stakeholders. b) No negative feedback was received. c) No negative feedback was received.
Ongoing communication	The logbook[19] is still maintained at the village head's office.
Stakeholder input	Any questions stakeholders had been answered, and their concerns were taken care of.

2.1.3 Free Prior and Informed Consent

Obtaining consent	Invitations to the stakeholder meeting were published beforehand and the local villagers were invited to the meeting.
Outcome of FPIC	The local villagers gave consent.

2.1.4 Grievance Redress Procedure

Development process	During the first and second monitoring period, a logbook was delivered to the Aslancık Village head's office. The villagers were informed about the notebook. The logbook has sections for feedback and complaints. The grievance mechanism ensures accessibility and transparency by allowing stakeholders to submit complaints

[19] Please see "Logbook" and "Şikayet kutusu"

	through multiple channels. Villagers can record grievances directly in the logbook kept at the Muhktar's office or report them verbally to the Muhktar, who then logs and communicates them to the power plant manager. Complaints can also be submitted via phone or email, as the Muhktar maintains direct contact with the plant manager. Upon receiving a complaint, the power plant manager reviews the issue, acknowledges it within a specified timeframe, and investigates to determine an appropriate resolution. If necessary, further consultations with stakeholders or higher management are conducted. Once resolved, the complaint and its resolution are documented in the grievance logbook, ensuring a transparent record of concerns and their outcomes. This system facilitates a clear and efficient grievance process, ensuring that all concerns related to the project are addressed in a timely manner.
Grievance redress procedure	If there are grievances, the local stakeholders write down in the logbook. Also, the village head (Mukhtar) and the local villagers are in constant contact and communication.

Grievances received	Resolution and outcome
No grievances were received.	There are no complaints or negative comments or demands from the project.

2.1.5 Public Comments

Comments received	Actions taken
No comments were received.	If there are any comments, the stakeholders can write it down in the logbook or talk to the village head and immediate action will be taken.

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

The management team has experience in identifying risks to stakeholders and the environment since the project start date which is 08-Mar-2014.

2.2.2 Risk Assessment

	Risks identified	Mitigation or preventative measure taken
Natural and human-induced risks to stakeholders' wellbeing	No risk identified	There are no risks that would affect the local people, only on the project site training and safety precautions are given.

Risks to stakeholder participation	No risk identified	There are no risks for stakeholder participation. Türkiye has ratified ILO convention 155 and about work safety and precautions.
Working conditions	No risk identified	Türkiye has ratified ILO convention 155 and about work safety and precautions.
Safety of women and girls	No risk identified	Türkiye has ratified ILO convention 155 and about work safety and precautions.
Safety of minority and marginalized groups, including children	No risk identified	There are no minority or marginalized groups in the project area.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	No risk identified.	Air quality and water pollution have been explained in Section 2.4. For noise pollution, a test was made and it was found that the noise the employees are subjected to are within accepted limits.20 Hazardous materials are collected regularly and are disposed of.[21]

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified[22]	Mitigation or preventative measure(s) taken
Discrimination	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142, which provides gender equality. It is also parallel with the national strategies prepared for women employment by creating opportunities for all.
Sexual harassment	No risk identified	The organization does not tolerate harassment for any women employees which includes sexual, psychological or any other form of harassment that can be a form of discrimination.

[20] Please see Gürültü Maruziyet Raporu, Page 11

[21] Solid and hazardous waste disposal documents have been shared.

[22] The identified risks and commensurate mitigation or preventative measure(s) for forced labor, child labor, and human trafficking, must be inclusive of staff and contracted workers employed by third parties.

Equal pay for equal work	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142, the same for discrimination goes for equal pay for equal work.
Gender equity in labor and work	No risk identified	Conventions 100, 111, 122 and 142 ensure gender equity in labor and work.
Forced labor	No risk identified	All employees are recruited according to the national legislations. There is no forced labour.
Child labor	No risk identified	Türkiye is a party of IPEC , since 1992 and ratified ILO convention 138 and 182.
Human trafficking	No risk identified	Türkiye has ratified European Convention on Human Right on 10-Mar-1954.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	Türkiye has ratified European Convention on Human Right on 10-Mar-1954. Therefore, the project does not violate human rights.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified	No sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture were observed in the project area. And no indigenous people were identified.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	The project site has acquired property rights in line with the existing legislation and implemented the project. No issues are raised due to property rights.

2.3.5 Benefit Sharing

Process used to design the benefit sharing plan	**Not Applicable as there is no impact on the property rights of the Stakeholders due to the project activity. Hence, there is no benefit sharing involved.**
Summary of the benefit sharing plan	Not Applicable as there is no impact on the property rights of the Stakeholders due to the project activity. Hence, there is no benefit sharing involved.
Approval and dissemination of benefit sharing plan	Not Applicable as there is no impact on the property rights of the Stakeholders due to the project activity. Hence, there is no benefit sharing involved.
Benefit sharing during the monitoring period	Not Applicable as there is no impact on the property rights of the Stakeholders due to the project activity. Hence, there is no benefit sharing involved.

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure(s) taken
Impacts on biodiversity and ecosystems	No risk identified	There are no risks on impacts on biodiversity and ecosystems.
Soil degradation and soil erosion	During construction phase, soil quality was affected by use of area and had erosion risks. The area on which construction activities are conducted is characterised mainly as having low agricultural value. The agricultural area covered comprises hazelnut forests, hazelnut plantations and scattered forest areas, but the actual project components are not located on these areas. Solid wastes represent another risk for soil quality. Due to the declines in the landscape, erosion risk impact of the project is deemed significant.	Mitigation measures were implemented such as planting regionally adapted tree types on terraces constructed in open areas with significant decline and high erosion potential. Solid wastes are collected in containers and are disposed of by the local waste management.
Water consumption and stress	Water quality was affected by concrete production, dust management, and use of potable water. The main impact was the production of 138,000 m^3 of waste	This was mitigated by installing and operating a sewage treatment facility on site. In addition, the facility was subjected to regular monitoring according to the environmental monitoring plan (EMP).

	water from washing concrete aggregates and concrete mixers.	
Air quality	Air quality was affected during construction by activities like transport, rock blasting, excavation etc. Dust emissions were significant, modelling of related concentrations and diffusion was conducted according to accepted standards and resulted in concentration indicators below regulatory limits.	Mitigation measures comprise of watering, implementation of dust filters for the concrete units, speed limits for construction vehicles, use of canvas covers, improvement of access roads, etc.

2.4.1 Rare, Threatened, and Endangered species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes ☒ No

Species and habitat	The project is not located in or adjacent to habitats for rare, threatened, or endangered species. More information is given below.
Areas needed for habitat connectivity	There are no risks related to areas for habitat connectivity. However, as a mitigation measure, limitations on number and intensity of rock blasting activities, and management of dust emissions have been implemented for possible displacement during the construction phase only.

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	Flora in the project region was subjected to a two-year survey, revealing no endemic species, no plants contained in the national list of rare, threatened and endemic plants, and no plants covered by the Bern Convention and CITES agreement. Fauna in the project area was subjected to a survey, checking the observed terrestrial and aquatic animals against the Red List of the Bern Convention and the Red List of IUCN.	The results were • 14 out of 52 observed mammal species were listed as "near threatened" and 5 as "vulnerable", • one out of 80 observed bird species was listed as "vulnerable", • one out of 20 observed reptile species is listed as "near threatened", • two out of 9 observed amphibian species were listed as "near threatened", and

	Impacts on both Fauna and Flora were expected due to dust emissions, vibration and noise during the construction, as well as due to flooding of areas in the damming phase.	• one out of 12 observed fish species was listed as "vulnerable" in the IUCN Red List. No endemic species were identified. There are no risks related to habitats for rare, threatened, and endangered species. The affected species are rich in population and have a high reproduction potential. Thus, no serious reduction in population, let alone extinction occurred.
Areas for habitat connectivity	No risk identified	There are no risks related to areas for habitat connectivity. However, as mitigation measures, limitations on number and intensity of rock blasting activities, and management of dust emissions have been implemented for possible displacement during the construction phase.

2.4.2 Introduction of species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
Alder, beech, pine	Tree	It was implemented as a mitigation measure to improve soil quality during construction.	There were no adverse effects because the species already existed in the area.

Existing invasive species	Mitigation measures to prevent the spread or continued existence of invasive species
There are no invasive species.	Since there are no invasive species, there are no mitigation measures to prevent the spread or continued existence of invasive species.

	Risks identified	Mitigation or preventative measure(s) taken
Invasive species	No risk identified	There are no invasive species.

2.4.3 Ecosystem conversion

	Risks identified	Mitigation or preventative measure(s) taken
Ecosystem conversion	No risk identified	Project area was not cleared or drained of existing natural ecosystems.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0002	Consolidated Methodology for Grid-connected electricity generation from renewable sources	22
Tool	Tool 07	Tool to calculate the emission factor for an electricity system	7.0
Tool	Tool 01	Tool for the demonstration and assessment of additionality	7.0
Tool	Tool 11	Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period	03.0.1
Tool	Tool 24	Common practice	03.1

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
ACM 0002	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); (c) Involve a retrofit of (an) existing operating plant(s)/unit(s);	Applicable. The project activity involves installation of a Greenfield power plant.

	(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	
ACM 0002	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).	Not applicable. This project does not involve the integration of a BESS.
ACM 0002	The methodology is applicable under the following conditions: (a) 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 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 may the BESS be charged with electricity from the grid or a fossil fuel electricity generator. In such cases, the corresponding	Applicable. This project is a hydro power plant.

	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	
ACM 0002	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, calculated using equation (7), is greater than 4 W/m^2 ; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m^2 ; or (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/m^2, 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/m^2; (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/m^2 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.	Applicable. The project activity is implemented in existing single reservoir with no change in the volume of the reservoir.
ACM 0002	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	Not applicable. This is not an integrated hydro power project.

	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 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.	
ACM 0002	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.	Not applicable. The project does not switch from fossil fuels to renewable energy sources at the site, and it is not a biomass fired power plant. This project is a greenfield project, so the project site did not have any previous power plants.
ACM 0002	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".	Not applicable. The project is not a capacity increase project.
Tool 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, i.e. 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 (e.g. demand-side energy efficiency projects).	Applicable. The project activity is installation of a new grid connected hydro power plant/ unit, thus substituting grid electricity that would be required otherwise without the project. Since the proposed

		project activity supplied electricity to the grid, the tool can be applied to calculate baseline emissions and emission reductions via OM, BM and CM emission factors.
Tool 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.	Applicable. The project activity is installation of a new grid connected hydro power plant/ unit, thus substituting grid electricity that would be required otherwise without the project. The emission factor is being calculated for grid power plants only.
Tool 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.	Not applicable. The project activity takes place in an Annex I country, yet this condition is not applicable, and the project is not a CDM project. The Program permits the application of the CDM methodologies and tools however is applicable to all geographical locations. Hence the project which is located in Türkiye an Annex I country is permitted to use the tool.

Tool 07	Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	Not applicable. The project activity is installation of a new grid connected hydro power plant/ unit, thus not involving any kind of biofuels.
Tool 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. They may also submit revisions to approved methodologies using the additionality tool.	Not applicable. The project participant is not proposing new methodologies.
Tool 01	Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory	Applicable. The additionality tool is included in an approved methodology.

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source
		CH4	No	Minor emission source
		N2O	No	Minor emission source
Project	CH4 emissions from the reservoir	CO_2	No	Minor emission source
		CH4	No	Main emission source
		N2O	No	Main emission source

ACM0002 Version 22 prescribes the baseline scenario for Greenfield power plants as the following:

“If the project activity is the installation of a Greenfield power plant with or without a BESS as described under paragraph 5(a) or paragraph 7(a) or paragraph 7(e) above, the baseline scenario is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in TOOL07.”

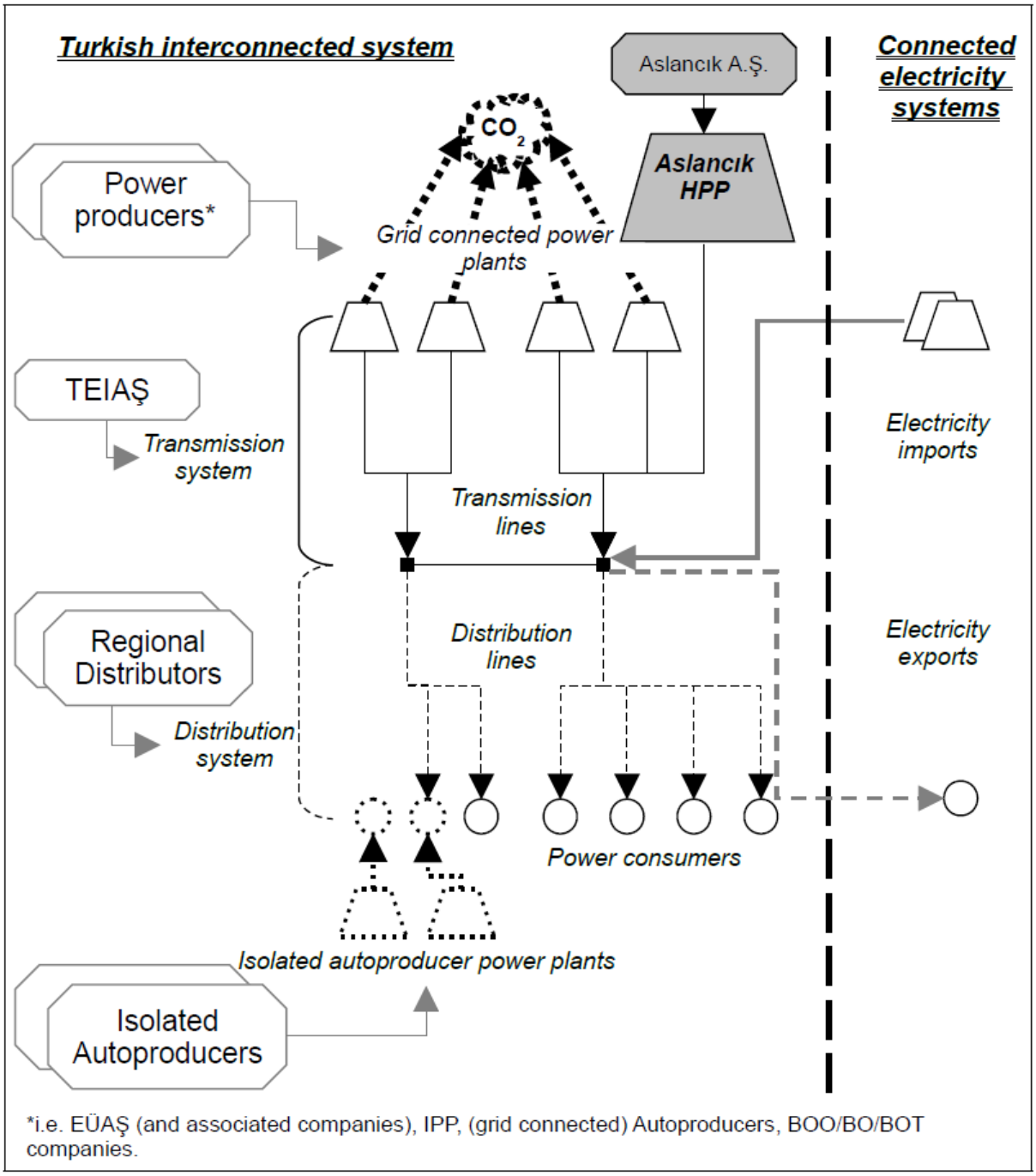
As Aslancık HPP is a new grid-connected power plant, this baseline scenario applies.

As a consequence, ACM0002 provisions about identification of GHG sources are as follows:

"The spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system6 that the CDM project power plant is connected to."

So, as relevant sources, basically all power plants connected physically to the Turkish national electricity grid and feeding electricity into it will be included in the project boundary. This includes power plants outside Türkiye supplying electricity imports into the Turkish grid. An overview is given below.

Figure 8 Flow diagram of Turkish electricity system



3.4 Baseline Scenario

ACM0002 Version 22.0 prescribes the baseline scenario for Greenfield power plants as the following:

"If the project activity is the installation of a Greenfield power plant with or without a BESS as described under paragraph 5(a) or paragraph 7(a) or paragraph 7(e) above, the baseline scenario is electricity delivered to the grid by the project activity that would have otherwise been generated

by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in TOOL07."

The methodological tool 11 "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0.1) is adopted to assess the continued validity of the baseline and to update the baseline. Tool 11 provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. According to Tool 11 the following steps are applied.

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

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

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

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

Step 1.2 Assess the impact of circumstances.

The new national circumstances have an impact on the EF of the grid and thus on the project's current baseline emissions. Accordingly, the EF is updated for the second crediting period in conformity with the latest version of the publication of the Türkiye's National Electric Grid Emission Factor for the year of 2021. There has been no major deviation or change in the market characteristic during the first crediting period. The plant's capacity was increased 5 MWe on 18-Dec-2017 from 93 MWe to 98 MWe during the first monitoring period.

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

According to the registered PDD, the technical lifetime of the plant is 30 years. Equipment only requires regular maintenance. The baseline scenario identified at the validation of the project activity was the continuation of grid-connected electricity generation. Under this scenario, no investment from the project's proponent or third party (or parties) has been envisioned later specifically for the project.

Step 1.4 Assessment of validity of the data and parameters.

The emissions reduction calculations are based on two main parameters: the energy produced and the grid emission factor. The latter will be updated as explained in the next paragraph.

As a requirement of the methodology, only the grid emission factor has been updated during the second crediting period renewal.

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

Step 2.1: Update the current baseline

As confirmed in Step 1, under the current context of the sectoral policies and circumstances, the project baseline for the next crediting period is the use of electricity from the national grid. This is conform to the provisions of the latest version of the approved applicable methodology to the project activity namely: ACM0002 version 22: Grid-connected renewable electricity generation from renewable sources. So, there has been no deviation in the baseline scenario.

Step 2.2: Update the data and parameters

The grid emission factor is updated according to the publication of Turkish Ministry of Energy and Natural Resources which is indicating Türkiye's National Electric Grid Emission Factor for the year of 2021 which is the latest data up to date.

3.5 Additionality

The project has demonstrated its additionality during its registration under the VCS. The following information is taken from the registered PDD.

3.5.1 Regulatory Surplus

Is the project registered or seeking registration in an UNFCCC Annex 1 or Non-Annex 1 country?

☐ Annex 1 country ☒ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

☐ Yes ☒ No

If the project is located inside a Non-Annex 1 country and the project activities are mandated by a law, statute, or other regulatory framework, are such laws, statutes, or regulatory frameworks systematically enforced?

☐ Yes ☒ No

3.5.2 Additionality Methods

This part is retrieved from the registered PDD (Pages 17-28)

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

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

Considering the expected market share and position of Aslancık A.Ş., representing only a minor share of expected hydro power generation and a negligible share of total generation, there is no indication that Turkish power production system as whole could be influenced by its decisions in any way. So, Aslancık A.Ş. has only the choice whether or not to implement the proposed project

activity. If not, the respective power will be provided by the *(then)* existing Turkish generation facilities as represented by Figure 5 and Figure 4 in Section 1.10 above. Concluding, only the following alternatives to the proposed project activity will be considered:

1.The proposed HPP project without origination and sale of Verified Carbon Units (VCUs).

2.The production of the projected electricity amount by the operation of grid-connected power plants as well as by those power plants subject to the upgrading of Turkish electricity generation according to [TEİAŞ Projection].

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

Both alternatives are in full compliance with all applicable laws and regulations. All required official approvals for Aslancık HPP are at hand. The electricity system expansion scenario has been published by an official Turkish authority making any conflict with applicable law very unlikely.

All the alternatives to the project outlined in sub-step 1a above are in compliance with applicable laws and regulations, including:

(1) Electricity Market Law (Law Number: 4628, ratified 20-Feb-2001, enacted 03-Mar-2001)

(2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity

Energy (Law Number: 5346, ratified 10-May-2005, enacted 18-May-2005)

(3) Environment Law (Law Number: 2827, ratified 09-Aug-1983, enacted 11-Aug-1983)

Step 2 Investment analysis

The purpose of this step is to demonstrate that the proposed project activity is not economically or financially feasible without the revenue from the sale of VCUs. According to the Additionality Tool, “Please note that the latest version of the “Guidelines on the assessment of investment analysis”, available on the UNFCCC website, shall be taken into account when applying this step.”

Sub-step 2.a Determine appropriate analysis method

The Additionality Tool provides for three options regarding investment analysis, i.e. (I) simple cost analysis, (II) investment comparison analysis, and (III) benchmark analysis.

Option (I) is considered appropriate only if the proposed project activity as well as the alternatives presented in Sub-step 1.a above generate no financial or economic benefits other than income from carbon trade. As all alternatives and the proposed project activity generate income from electricity sales as well, Option (I) is not applicable.

Option (II) investment comparison is also not applicable. The Annex to the Additionality Tool states: " If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate." Aslancık A.Ş. has only the choice between implementing the proposed project activity or not investing at

all. In the latter case, alternative no. 2. as described in Sub-step 1.a above would become effective, which is equal to the one described in the citation above.

Concluding, Option (III), i.e. benchmark analysis, is chosen.

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

First, an appropriate financial indicator must be determined to measure economic attractiveness/feasibility of the proposed project activity. For the investment decision context of Aslancık HPP, the appropriate indicator is considered to be equity IRR, because the essential question at the time of investment decision was whether the equity invested by Aslancık A.Ş. could be expected to yield a sufficient return. Aslancık A.Ş. has made the actual investment decision on 21-Jul-2010 when the contract with the construction company was closed. A full overview on the most relevant project development milestones is given below.

Table 8 Project Time Line

Project development step	**Date**
Agreement on use of water resources with (Devlet Su İşleri Genel Müdürlüğü, DSİ)	17-Jan-2007
Finalisation of EIA Report	01-Feb-2008
Granting of EPDK production licence	20-Mar-2008
Environmental Approval by TÇOB	02-Apr-2008
Grid connection agreement with TEİAŞ	01-Jul-2008
Board Decision to use carbon credits	25-Aug-2008
First Carbon Market Consultant Contract	02-Sep-2008
Signing of loan term sheet	01-Jun-2010
Completion of pre-feasibility study	Jul-2010
Time of investment decision: Construction contract	21-Jul-2010
First down payment for construction works	22-Jul-2010
Contract with technology provider	22-Dec-2010
Contract for power line	30-Nov-2010
First payment for power line	14-Dec-2010
Bank loan contract	24-Jan-2011
First payment to technology provider	18-Feb-2011
Confirmation of Board Decision to use Carbon Credits	08-Jun-2011
Termination of Carbon Asset Development Agreement with initial consultant	15-Jun-2011
New carbon consulting contract with current carbon market consultant	01-Jul-2011
Expected date of full HPP commissioning	01-Oct-2013

According to clause 12 of the Investment Analysis Guidelines Version 05, the appropriate benchmark for equity IRR is required return on equity.[23]

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

The Additionality Tool states that "When applying Option II or Option III, the financial/economic analysis shall be based on parameters that are standard in the market, considering the specific characteristics of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer" except for certain particular circumstances. More precisely, the Investment Analysis Guidelines state in their clause 13: "In cases of projects which could be developed by an entity other than the project participant the benchmark should be based on parameters that are standard in the market." As the development of HPP projects in Türkiye is not reserved to one company only, the application of parameters that are standard in the market is obligatory.

According to clause 15 of the Investment Analysis Guidelines, the cost of equity can be determined by selecting values from a list provided in an Annex to the Investment Analysis Guidelines. This list displays default values for expected return on equity calculated on real terms after taxes for a variety of countries and for three groups of project types, respectively. While Türkiye is not included in this list, the calculation can be reproduced for Türkiye according to the calculation method explained in the Appendix to the Investment Analysis Guidelines:

"The expected return on equity is composed of four elements: (a) a risk free rate of return; (b) an equity risk premium; (c) a risk premium for the host country; and (d) an adjustment factor to reflect the risk of projects in different sectoral scopes." The risk-free rate is determined as 3.0%, the equity risk premium as 6.5%. The country risk premium is derived from the country's Moody's rating. The adjustment factor depends on the project type. Project types are assigned to three groups. Group 1 incorporates the sectoral scope "Energy Industries" to which Aslancık HPP belongs.

This means that applicable values for "Group 1" projects only differ between countries with different Moody's ratings, as can easily be verified by checking the table. Concluding, the applicable value for a "Group 1" project in Türkiye must be equal to the values for "Group 1" projects in other countries with the same Moody's rating as Türkiye. The Moody's rating of Türkiye as of Jan-2012 is Ba2.[24] It has also been Ba2 in 2011 and 2010, respectively.[25] Concluding, the value displayed in the list contained in the Investment Analysis Guidelines for countries with a Ba2 rating is applicable to Türkiye, too. These countries are Armenia, Guatemala, Indonesia, and Jordan. The "Group 1" value for these countries is 12.5%.

[23] https://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

[24] pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.htm

[25] http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem10.xls

According to the Investment Analysis Guidelines, this value may be converted into a nominal value by adding the inflation rate in situations where an investment analysis is carried out in nominal terms. As the IRR calculation provided for Validation is conducted in nominal terms, the value must be converted. According to the Investment Analysis Guidelines, the inflation rate shall be obtained from the target inflation rate of the central bank in cases where the inflation forecast for the duration of the crediting period is not available. This duration is 10 years, and no inflation forecast is available from Central Bank of Türkiye (Turkish: Türkiye Cumhuriyet Merkez Bankası, TCMB) for this duration. Thus, the target rate is applied which is 5%.[26] Seen as the current and recent historical rates have been much higher, this can be considered as highly conservative, please refer also to Table 9 below.

Concluding, the benchmark is calculated as 12.5%+ 5% = 17.5%.

The equity IRR for Aslancık HPP is calculated based on data and assumptions as displayed below.

Table 9 Financial Data for Aslancık HPP

Total Investment	$213,997,000
Equity	$53,997,000
Bank Loan Amount	$160,000,000
Bank Loan Duration (after plant commissioning)	9 years
Bank Loan Interest	3.95% + LIBOR
Assumption for LIBOR[27]	0.7185%
Operation Costs + Transmission Fee (annually)	$2,548,400
Assumption for Power Price	120.00 USD/MWh
Royalty fee to be yielded to DSİ	53.77 USD/MWh
Annual electricity generation (net)	418,170 MWh/yr

Based on these assumptions, the equity IRR after taxes is calculated as 11.31% in nominal terms, without any income from carbon credits. This value is clearly below the benchmark of 17.5%.

As a preliminary conclusion, the proposed project activity is not economically or financially feasible without origination and sale of VCS VCUs. Including VCS VCUs and assuming a price of 6 USD/VCU, would lead to an equity IRR of 12.4%.

Sub-step 2.d Sensitivity analysis

To demonstrate that the preliminary conclusion deduced above is robust to reasonable variations in the critical assumptions, a sensitivity analysis is conducted. The Additionality Tool suggests to subject only those variables to variation that constitute more than 20% of total project costs.

[26] See TCMB Inflation Report 2012-I, page 9. https://www.tcmb.gov.tr/wps/wcm/connect/c6322a52-deda-4c28-8682-9b922edec807/1c12-1.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-c6322a52-deda-4c28-8682-9b922edec807-m3fw8p6

[27] Monthly average for July 2010, see https://www.global-rates.com/en/interest-rates/libor/european-euro/historical/2010/

Also, it suggests that a general point of departure should at least cover a range of +10% and -10%.

The variables included in the sensitivity analysis are:

1. Total annual gross income, depending on annual net generation
2. The investment costs

A compilation of the corresponding variations is given in

Table 10 Sensitivity Analysis

	Variation acc. to Additionality Tool			Variation to reach benchmark	
Variable	**Deviation**	**Value**	**IRR**	**Deviation**	**Value**
Net annual electricity production	+10.00%	460,000 MWh/yr	13.61%	+26.34%	528,300 MWh/yr
Total Investment	-10.00%	$192,590,000	13.79%	-21.28%	$168,450,000
Power tariff	+10.00%	132.00 USD/MWh	15.44%	+14.88%	137.85 USD/MWh

Any variation to reach the benchmark is highly unlikely or even impossible:

PMUM power price history clearly shows that the assumption of 120 USD/MWh was highly optimistic, and any increase is very unlikely. An overview is given below.

Table 11 Average Power Prices in Türkiye 2006 - 2011[28]

Year(s)	2006	2007	2008	2009	2010	2011	Average 2006-2011
Annual average (USD/MWh)	79.65	98.07	124.08	93.76	81.43	75.49	93.61

Step 3 Barrier analysis

Sub-step 3.a Identify barriers that would prevent the implementation of the proposed project activity:

The barriers that prevent the project from being implemented unless additional revenues from VCS VCUs accounting for its climate protection effects can be generated mainly result from the general economic situation in Türkiye as well as from the legal framework for the promotion of

[28] For TL nominated prices, see https://seffaflik.epias.com.tr/electricity/electricity-markets/day-ahead-market-dam/market-clearing-price-mcp

Exchange rates have been taken from TCMB, see http://evds.tcmb.gov.tr/yeni/cbt-uk.html.

REN sources in effect in Türkiye at the time of investment decision, i.e. on 21-Jul-2010, see Table 9 in Section 2.5 above.

A. High country risk:

A.1.Economic key data

The Turkish economy must be considered as a rather volatile and risk intensive economy, not least due to the experience of "a series of severe currency and financial crises culminating in the financial crisis of 2001".[29]

Since then, Türkiye has achieved steady economic growth, but the global financial crisis has led to a slowdown in years 2007 and 2008. At the time of investment decision in the middle of 2010, Türkiye had just experienced the first recession year for long time. Table 12 below compiles economic key data for the most recent years, showing high inflation rate, a high public debt to GDP ratio, a constant current account deficit, and a high cost of money.

Table 12 Key Economic Indicators for Türkiye

Year	2005	2006	2007	2008	2009	2010
GDP growth [%][30]	8.40	6.90	4.70	0.70	-4.80	8.90
Inflation [%][31]	8.20	9.60	8.80	10.40	6.30	8.60
Current account/GDP [%][32]	-4.60	-6.10	-5.90	-5.70	-2.30	-6.60
Debt stock/GDP [%][33]	51.10	45.50	39.60	40.00	46.30	42.90
Lending rate [%][34]	26.00	28.00	27.00	26.50	Not applicable	Not applicable

With regard to GDP growth rate, the expectations in [IMF WEO 2011] are 6.6% for 2011, 2.2% for 2012, and 4.3% for 2016.[35]

[29] European Bank for Reconstruction and Development (EBRD), 2008: Request by Turkey to Become a Recipient Country of the EBRD: Strategic Review, p. 4. [EBRD Request Review]

[30] Gross domestic product annual growth rate. Source: International Monetary Fund (IMF): World Economic Outlook September 2011, p. 182. http://www.imf.org/external/pubs/ft/weo/2011/02/pdf/text.pdf; [IMF WEO 2011]

[31] Average annual change in consumer price index CPI. Source: [IMF WEO 2011], p. 188.

[32] Source: [IMF WEO 2011], p. 198.

[33] https://ms.hmb.gov.tr/uploads/sites/2/2018/12/Public-Debt-Management-Report-2011.pdf

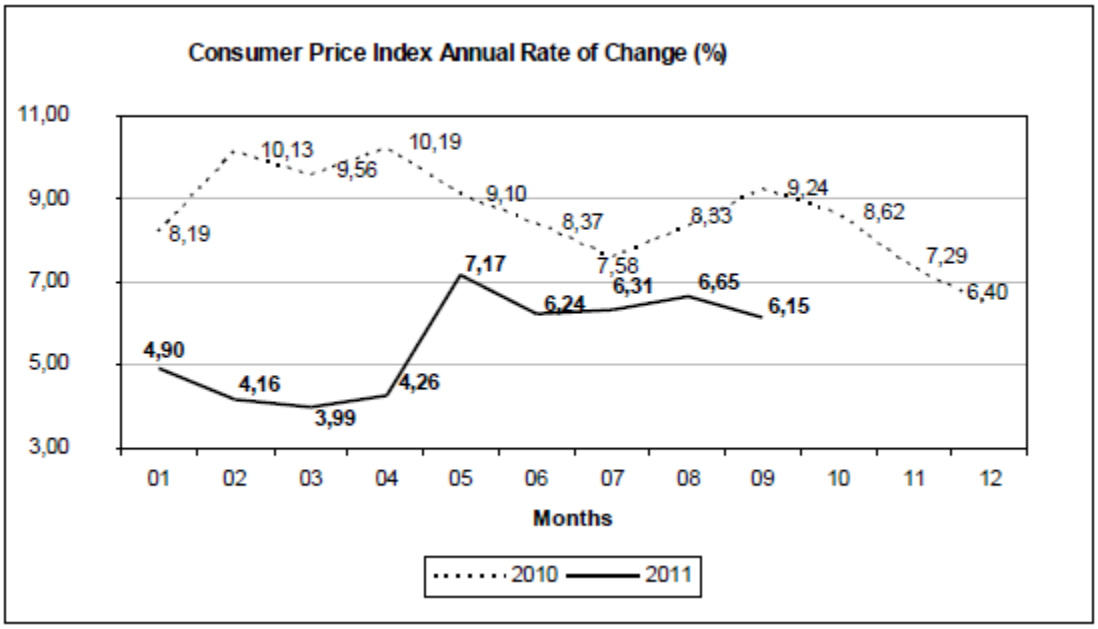
[34] Source: EBRD (2009): Strategy for Turkey, p. 57. Note: 2008 value is estimated.

http://www.ebrd.com/downloads/country/strategy/turkey.pdf. [EBRD Country Strategy]

[35] Source: [IMF WEO 2011], p. 182

As for Inflation, the IMF projections are: 6.0% for 2011, 6.9% for 2012, and 5.0% for 2016.[36] Data on inflation provided by Turkish Statistical Institute (Turkish: Türkiye İstatistik Kurumu, TÜİK) is represented below.

Figure 9 Inflation in Türkiye 2010-2011[37]



For Current Account Deficit, [IMF WEO 2011] projections are: -10.3% in 2011, -7.4% in 2012, and -7.5% in 2016.[38]

In 2009, EBRD emphasized the highly adverse coincidence of current account deficit with fiscal deficit, leading to high dependency on domestic and external financing.[39]

For Debt to GDP Ratio and lending rate, no updated figures are available.

Another major problem is the highly volatile exchange rate of the New Turkish Lira (Turkish: Yeni Türk Lirası; YTL) against hard currency like Euro (EUR) or US-Dollar (USD).[40]

[36] See [IMF WEO 2011], p. 188.

[37] https://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Statistics/Inflation+Data/Consumer+Prices Figure is copied directly and thus shows numbers with commas (i.e. ",") for decimal points as usual for Turkey.

[38] See [IMF WEO 2011], p. 198.

[39] See [EBRD Country Strategy], p. 4.

[40] See exchange rate statistics available on TCMB website: https://evds2.tcmb.gov.tr/index.php?/evds/serieMarket/collapse_2/5863/DataGroup/turkish/bie_dkdovytl/

A.2.Türkiye as a Business Location

Economic key data as presented above leads to a high risk perception by both investors and banks, resulting in comparably high return requirements by investors and significant difficulties in obtaining credit capital. This lack of investor confidence is reflected i.a. in the following EBRD statement on Türkiye's attractiveness for Foreign Direct Investment (FDI)[41]: "Türkiye's record in attracting greenfield FDI has been disappointing until very recently as macroeconomic instability, corruption, inadequate infrastructure, and the unpredictability of the legal regime deterred investors. The country attracted US$ 22 billion in foreign direct investment last year [i.e. 2007, author's note], which is the second straight year of strong FDI inflows; however, at only 3 per cent of GDP, these inflows are still quite modest compared to other transition countries in relative terms."

FDI inflows in terms of share of GDP have even deteriorated since then, i.e. to 2.5% in 2008, and to 1.8% in the first quarter of 2009.[42] For current data see

Table 13 Net FDI in Türkiye (million USD)[43]

2007	2008	2009	2010
19,940	15,720	6,879	8,500

Although these developments have been somewhat curbed, and Türkiye has experienced a strong re-bound, there is still the challenge to transform this into strong and sustained growth.[44]

General investment environment is also reflected in Türkiye's ranking according to the World Bank's "Doing business" project, which aims at comparing the ease of doing business in 183 countries, using a set of 10 indicators.[45] Türkiye's aggregate rank for 2011 is 65, as compared to 60 in year 2010.[46] A more detailed breakdown reveals further adverse results, like e.g. the rank in indicator "Dealing with construction permits", which is highly relevant for REN projects in general. Here, Türkiye's rank has fur-ther decreased from 133 to 137, due to comparably large number of procedures, long processing time, and high costs.

B. Legal framework for the promotion of different energy sources

B.1. Law no. 5346 on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy:

[41] See [EBRD Request Review], p. 5.

[42] See [EBRD Country Strategy], p. 23.

[43] Source: http://www.ebrd.com/pages/research/publications/flagships/transition/turkey.shtml

[44] See Rauf Gonenc/OECD: Turkey: Exiting the crisis on a stronger growth path. http://www.oecd.org/dataoecd/13/5/46067652.pdf.

[45] See https://archive.doingbusiness.org/en/methodology

[46] See http://doingbusiness.org/data/exploreeconomies/turkey.

Representing the basis of legal support for REN in Türkiye, this law was enacted in 2005. The provisions contained in its first version limited the purchase guarantee for REN projects to less than ten years and did not mitigate the price risk, as the feed-in tariff was linked to the average market price without any guaranteed minimum. Due to this deficiency with respect to providing incentives to invest in REN power plants[47] article 6 of law no. 5346 was amended by law no. 5627 dated 02-May-2007.[48] The new provisions comprise power purchase obligations imposed on power retailers thus ensuring, that electricity from renewable sources will be sold regardless of the time of its production. But the provisions remain unfavourable, in particular when compared to provisions for other power sources in other legislation:

B.1.a. Guaranteed feed-in tariffs according to law no. 5346, though providing for a minimum tariff of 0.05 EUR/kWh, are meanwhile limited to a maximum of 0.055 EUR/kWh whereas e.g. the "Law on Establishment and Operation of Nuclear Power Plants and Sales of Energy" (Law no. 5710) enacted on 20-Nov-2007 excludes nuclear plants from any price cap for the generated electricity.

B.1.b. Again, the application of this is limited to plants commissioned until the end of 2011 and is guaranteed only for ten years, while the operation time of HPPs typically is up to 50 years. In contrast, law no. 5710 provides for purchase obligations for a period of 15 years for coal fired power plants with a capacity of more than 1,000 MW as well as for nuclear plants. Also, it provides for a subsidy scheme for coal fired power plants with a capacity of more than 1,000 MW.

B.1.c. Finally, although set in Euro cents, the feed-in tariffs pose an exchange rate risk as they are paid out in YTL by Türkiye Elektrik Dağıtım Şirketi (TEDAŞ), which provides a purchase guarantee for the entire electricity produced by the HPP. TEDAŞ applies the EUR-YTL exchange rate on the date of invoice for the electricity produced, while the actual payment is made around one month after this date. As debt service typically represents the highest share in cash outflow for HPP projects, projects with imported equipment and financed with foreign currency nominated loans face a severe risk of devaluation of YTL, given that even within one month the exchange rate is highly volatile.

Concluding, the provisions of law no. 5346 as valid at the time of investment decision were clearly insufficient for providing significant incentives for investment in HPPs in Türkiye.[49] This is also reflected in several announcements to revise regulations involving an increase of the guaranteed feed-in tariff to 0.07 - 0.08 EUR/kWh. But the respective expectations of market participants remained to be disappointed for a long time, with the respective announcement being temporarily

[47] See GS VER PDD of GS registered Sayalar 30.4 MW Wind Farm Project (https://registry.goldstandard.org/projects/details/1651)

[48] Energy Efficiency Law

https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=5627&MevzuatTur=1&MevzuatTertip=5

[49] See statements by Mr. Ü. Tolga BILGIN, chairman of Turkish wind power and hydro power plants businessmen's association (RESSIAD) as documented http://www.ressiad.org.tr/haber1.html

withdrawn by govern- mental authorities.[50] On 29-Dec-2010, the long awaited legal change was finally effected by passing law no. 6094[51] which amends law no. 5346. Institutional uncertainty w.r.t. promotion of REN sources is clearly demonstrated by this long and erratic legislative process, and, what is more, the renewed change did not bring the improvements hoped for.

Although fixed feed-in tariffs have now been introduced for many kinds of REN technologies, those for HPPs remain more or less on the same level as before, due to the fact that they are now USD nominated instead of EUR, see

Table 14 REN Feed-in Tariffs (USD/kWh) According to Law No. 6094

Hydro Power	0.073
Wind Power	0.073
Geothermal Power	0.105
Biomass (incl. landfill gas)	0.133
Solar Power	0.133

Given USD-EUR exchange rates of the previous year, these tariffs actually represent a reduction, see

Table 15 USD-EUR Exchange-rates since Coming into Effect of Law No. 6094 and Resulting EUR Denominated Feed-in Tariffs[52]

	1 EUR =	**Date**	**feed-in tariff (EUR/MWh)**
Low	1.2669 USD	16-Jan-2011	57.62
Peak	1.4882 USD	04-May-2011	49.05
Average	1.3752 USD	29-Dec-2010 – 01-Jun-2012	53.08

What is more, this law is limited to facilities commissioned between 18-May-2005 and 31-Dec-2015 and remains valid only for 10 years.

The whole legal history clearly demonstrates the high level of institutional uncertainty in Türkiye w.r.t. promotion of REN sources.

B.2. **Options for commercialization of electricity generated from run-of-river HPPs on the Turkish Electricity Balancing and Settlement Market:**

Law no. 5346 generally allows for benefiting from the opportunity to sell electricity in the market if the market price is higher than the feed-in tariff limit of 0.055 EUR/kWh (or now 0.073 USD/kWh). Since the start of operation of PMUM in Aug-2006, REN electricity producers have

[50] See DEWI MAGAZIN No. 36, February 2010, p. 27.

[51] https://www.resmigazete.gov.tr/eskiler/2011/01/20110108-3.htm

[52] See http://www.ecb.europa.eu/stats/exchange/eurofxref/html/eurofxref-graph-usd.en.html.

indeed used this option, which is facilitated by the exemption from delivery obligations for non-dispatchable REN plants.

Electricity from those plants is sold upon its production and priced by applying the previous month's averages for each of the three pricing periods of the day, respectively, i.e. day time, peak time, and night time.

From the point of view of a decision to invest in a highly capital intensive long-term project[53], however, significant risks are associated with this option, making it hard to base a financing and investment decision on the market only:

B.2.a. First of all, there is no guarantee that prices on the market will be and will remain higher than the guaranteed feed-in tariff. Once the current demand surplus is mitigated or even reversed, the price level on PMUM might well be much lower. The price development since 2006 drastically demonstrated this, see Table 12 above.

B.2.b. Second, there is no guarantee that PMUM will remain a reliable purchaser of volatile and non-dispatchable REN power. While there is indeed an exemption from delivery obligations for REN producers, in return there is also no obligation to take off the power. The market situation for REN plants may deteriorate dramatically, whether in short term due to economic cycle related electricity demand collapse (see item above) or systematically due to structural changes in supply and demand relations driven by the implementation of large scale capacity additions of dispatchable plants (as is intended and planned for Türkiye and reflected by the unbalanced legal framework, see item B.1. above).

B.2.c. Moreover, as there is no economically feasible way of timing the electricity production for a run-of-river HPP, the risk of power being produced during night time and being respectively unfavourably priced is very high for run-of-river HPPs, while thermal power plants in general do not face such a risk.

B.2.d. Finally, the prices on PMUM are YTL nominated. Given the significant volatility of exchange rates (see item A.1. above), any power producer sourcing the equipment from the USD currency area faces a considerably high exchange rate risk.

C. Consequences for the proposed VCS project activity

C.1. Unfavourable credit conditions

[53] For a comparison of specific investment costs between different types of power sources, see https://www.epdk.gov.tr/Detay/DownloadDocument?id=DFWz+Xc08uw=

With the unfavourable economic background described in item A. above and the evenly unfavourable institutional background described in item B. above, the resulting credit conditions are adverse: A variable interest rate is applied, comprising the LIBOR plus a bank premium.

In an already highly risk-intensive context, the variable credit interest rate poses additional risks to the project, making future costs hard to calculate.

The credit duration of 9 years poses a significant liquidity risk to the project in its first years of operation. The high debt service burden in early years severely endangers liquidity and might actually necessitate further equity injections, because the projected income from electricity sales might not be sufficient to service debt after deduction of operating costs.

This is reflected also by the financing bank's request for significant sureties to be incorporated into the loan contract conditions. Against this background, the loan cannot be considered as straight project finance, thus relocating the project risks almost completely to the shareholders of Aslancık A.Ş. The involvement of sureties beyond the project assets is also a clear indication that the bank did not consider the project to be able to service debt based on only its internal profitability.

C.2. Double exchange-rate risk

As the equipment procured is paid in USD, the loan for the project must be obtained in the same currency. However, the business model was based on the guaranteed feed-in tariff effective on 21-Jul-2010. At that time, it was defined by law no. 5346 and nominated in EUR. Concluding, there was a severe exchange-rate risk significantly endangering project success because credit costs are the essential financial burdens during operation phase. Devaluation of the EUR against the USD would lead to significant increases in financial burdens. Also, the exchange rate between EUR and YTL remains relevant, because of the situation explained in item B.1.c. above. So, there was a double exchange-rate risk for the project at the time of investment decision.

D. Conclusion

Given the fact that an investment in hydroelectricity represents a financial commitment with very long terms, it is essential for the feasibility of such a project to have as many parameters which are predictable and reliable. The main parameters for the investment decision are electricity yield and electricity price on the return side, and debt service costs on the cost side. As demonstrated above, none of these parameters remain reliable and predictable, because (i) electricity yield is depending on precipitation which is beyond the project owner's control; (ii) electricity price is subject to mani- fold risks, particularly to exchange-rate risk; and (iii) debt service cost is not predictable due to variable interest.

Concluding, the essential requirements for security of investment are not fulfilled, making the project financially not attractive without additional sources of revenue.

Sub-step 3.b Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

The analysis of the effects of the institutional setting for the energy sector in Türkiye clearly indicates a bias in favour of conventional energy sources. While scenario 2 is mainly characterised by these plant types, the institutional setting constitutes a barrier only effecting scenario 1.

Concluding, barrier analysis clearly shows that scenario 2 is not affected by the barriers described above, so scenario 1 is neither the baseline nor part of it.

Step 4: Common practice analysis

For project activities measures involving the use of renewable energy[54], the Additionality Tool 24 Version 3.1 provides for a stepwise approach to demonstrate that the project activity is not common practice:

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

The installed capacity of Aslancık HPP is 93 MWe, thus, the applicable output range is

46.5 MWe – 139.5 MWe.

Step 2 In the applicable geographical area, identify all plants that deliver the same output of capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered project activities and project activities undergoing validation shall not be included in this step.

The applicable geographical area is Giresun province, where Aslancık HPP is located. The development of HPP projects in Türkiye depends very much on the local and regional con- ditions like e.g. water flow, availability of skilled workers and engineers, provincial permission procedures, etc.

A respective list is given below.

Table 16 IPP HPPs in Giresun Province[55]

Company Name	Project Name	Capacity (MW)
Kalen Enerji Elektrik Üretim A.Ş.	Aksu HPP	5.20
Çelikler Elektrik Üretim A.Ş.	Ören HPP	27
Erciyes Anadolu Holding	Sümer HPP	22
Kalyon Enerji Grubu	Kalen HPP	37
Fazlı Enerji	Kıran HPP	9.74

[54] See paragraph 6 of the Additionality Tool

[55] Projects in operation in Giresun province derived from https://www.enerjiatlasi.com/sehir/giresun/

Armahes Müh. Müş. Enerji San. Ve Tic. Ltd. Şti.	Muratlı HPP	38
Kolin Enerji	Doğankent HPP	75

Only Doğankent A+B HPP operated by EÜAŞ lies within the applicable output range. Concluding, N_{all} = 1.

Step 3 Within plants identified in Step 2, identify those that apply technologies different than the technology applied in the proposed project activity. Note their number N_{diff}.

Doğankent HPP is operated by EÜAŞ, the subsequent company of the formerly fully integrated public electricity utility now limited to operating power plants. It is still a public company, operating a large amount of HPPs and still investing in new HPPs. Aslancık HPP in contrast, is operated under the IPP business model, which implies completely different risk and income structures. Thus, N_{diff} = 1.

Step 4 Calculate factor F = 1-N_{diff}/N_{all} representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same out- put or capacity as the proposed project activity.

F = 1-1/1 = 0.

The proposed project activity is a "common practice" within a sector in the applicable geographical area if both the following conditions are fulfilled:

(a) the factor F is greater than 0.2, and

(b) N_{all}-N_{diff} is greater than 3.

With F = 0 and N_{all} – N_{diff} = 0, the proposed project activity is not common practice and thus additional.

3.6 Methodology Deviations

Not Applicable, since there is not any methodology deviation applicable for the project activity.

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

For the implementation of the project activity, the first was taken in 2007 with the agreement with State Hydraulic Works on the agreement to use water sources. The power plant was commissioned on 08-Mar-2014. Since then, the project has been operating normally, and no special events have occurred having an impact on GHG emission reductions or monitoring. The table below provides an overview of the project's development steps.

Table 17 Project timeline

Project development step	Date
Agreement on use of water resources with (State Hydraulic Works – DSİ)	17-Jan-2007
Finalization of EIA Report	01-Feb-2008
Granting of EPDK production license	20-Mar-2008
Environmental Approval by Environmental and Urbanization Ministry	02-Apr-2008
Grid connection agreement with TEİAŞ	01-Jul-2008
Contract for power line	30-Nov-2010
Commissioning for second unit	07-Mar-2014
Commissioning for first unit	19-Sep-2014
Start date of the first crediting period	08-Mar-2014
End date of the first crediting period	07-Mar-2024
Start date of the first monitoring period	08-Mar-2014
Revision of generation license to 98 MWe	18-Dec-2017
End date of the first monitoring period	31-Dec-2019
Start of the second monitoring period	01-Jan-2020
Current TEİAŞ System Usage Agreement	05-Mar-2021
End of the second monitoring period	30-Apr2022
Start of the third monitoring period	01-May-2022
End of the third monitoring period	07-Mar-2024
Start of the second crediting period	08-Mar-2024
End of the second crediting period	07-Mar-2034

5 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

For the emission factors, that were used to calculate estimated emission reductions, publication of Turkish Ministry of Energy and Natural Resources which is indicating Türkiye's National Electric Grid Emission Factor for the year of 2021 [56] was used and includes Operating Margin (OM), Build Margin (BM), and Combined Margin (CM) emission factor values. To calculate these figures, the

[56] Please see Please see https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/TUESEF_Bilgi_Formu.pdf

ministry bases the factsheet off of Clean Development Mechanism's Tool 07 "Tool to calculate the emission factor for an electricity system" Version 07.

The data set used for the calculation of emission factors are as follows:

- Türkiye's electricity generation, consumption, and loss statistics from TEİAŞ,
- Common Reporting Format (CRF) prepared in the scope of Türkiye's National GHG Inventory Report and emission values for electricity generation (1.A1.a.i) from CRF tables,
- Chronological order of electricity generation plants' s commissioning dates, their names, fuel types, installed power values, and electricity generation for the calculated year from TEİAŞ's Load Dispatch Department,
- Current status for Voluntary Emission Reductions (VER) certificate ownership from Gold Standard (GS) and Verified Carbon Standard (VCS) websites, and
- Efficiency figures for power plants are used from CDM's "TOOL9: Determining the baseline efficiency of thermal or electric energy generation systems."

Calculated emission factors for 2021 from the ministry's factsheet are provided below.[57]

OM=0.7279

BM=0.3541

CM=0.44755

Nevertheless, the CM value the ministry provided is only valid for the first crediting period. Per Tool 7's specifications, renewable energy projects – except for wind and solar – must use the following weighting of OM and BM factors for the CM factor's calculation.

According to ACM0002's Tool 7 Version 7.0 section 6.6.1 paragraph 85 specifications, renewable energy projects – except for wind and solar ones – should calculate the CM factor for the second and third crediting period by taking wOM as 0.25 and wBM as 0.75.

Thus, the CM factor for the second crediting period should be calculated as 0.4929, by using the ministry's BM and OM values and the respective weights per the methodology.

Baseline emissions include only CO2 emissions from electricity generation in fossil fuel power plants that are displaced due to the project activity is calculated as follows:

[57] Please see https://enerji.gov.tr/Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUESEmisyonFktr/Belgeler/TUESEF_Bilgi_Formu.pdf

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$[58]

where

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

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

$EF_{grid,CM,y}$ = Combined margin CO2 emissions actor for grid-connected power generation in year y calculated using the latest version of "Tool to calculate the emission factor for an electricity system" (t CO2/MWh)

According to ACM 0002 Version 22, section 5.5.1.1 paragraph 59, "If the project activity is the installation of a Greenfield power plant with or without the BESS or PSPs operating in coordination with a Greenfield power plant, as described under paragraph 5(a) or paragraph 7(a) above $EG_{PJ,y}$ shall be calculated as follows:

$$EG_{PJ,y} = EG_{facility,y}$$[59]

where,

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

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

Calculation of Operating Margin Emission Factor

With respect to the data provided above, Türkiye's Energy and Natural Resources Ministry calculated the OM emission factor as:

$$EF_{grid,OMsimple,y} = 0.7279\ t\ CO_2/MWh$$

Calculation of Build Margin Emission Factor

[58] ACM0002 Tool 07 Version 7.0 Section 6.6.1 Paragraph 85 Equation (16)

[59] ACM 0002 Version 22, Section 5.5.1.1 paragraph 59 Equation (12)

The ministry used data concerning the chronological order of electricity generation plants' s commissioning dates, their names, fuel types, installed power values, and electricity generation for the calculated year to measure the BM emission factor. The following is the result:

$$EF_{grid,BM,y} = 0.3541\ t\ CO_2\ /MWh$$

Calculation of Combined Margin Emission Factor

According to TOOL 7 Version 7.0 Section 6.6.1 paragraph 85's stipulations, the combined margin emission factor should be calculated as:

$$\mathrm{EF_{grid,CM,y}} = \mathrm{EF_{grid,OM,y}} \times \mathrm{w_{OM}} + \mathrm{EF_{grid,BM,y}} \times \mathrm{w_{BM}} 60$$

where,

$\mathrm{EF_{grid,BM,y}}$= Build margin CO_2 emission factor in year y (t CO_2/MWh)

$\mathrm{EF_{grid,OM,y}}$ = Operating margin CO_2 emission factor in year y (t CO_2/MWh)

$\mathrm{w_{OM}}$= Weighting of operating margin emissions factor (per cent)

$\mathrm{w_{BM}}$ = Weighting of build margin emissions factor (per cent)
as,

$$\mathrm{OM} = 0.7279 \quad \mathrm{BM} = 0.3541$$
$$\mathrm{w_{OM}} = 0.25 \quad \mathrm{w_{BM}} = 0.75$$

Thus,

$$\mathrm{EF_{grid,CM,y}} = 0.7279 \times 0.25 + 0.3541 \times 0.75$$
$$\mathrm{EF_{grid,CM,y}} = 0.44755\ \mathrm{t\,CO_2\,/MWh}$$

5.2 Project Emissions

The project activity involves no emissions, except from a diesel generator used for emergency backup purposes. The possible emissions from the use of fossil fuels for the back up or emergency purposes by the operation of this diesel generator are neglected according to the methodology[61].

The power density (PD) for the Aslancık HEPP is calculated according to the directions given in the methodology[62]:

[60] Tool 07 v.07, Section 6.6.1. paragrapgh 85 Equation (16)

[61] ACM0002 Version 22, Section 5.4.1, Para. 42.
https://cdm.unfccc.int/UserManagement/FileStorage/R0IJ1X9LQ7W2GOYHSMBFCPE3VKZ685

[62] Please refer to https://cdm.unfccc.int/UserManagement/FileStorage/R0IJ1X9LQ7W2GOYHSMBFCPE3VKZ685

$$PD\left(\frac{W}{m^2}\right) = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$ [63]

where,

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

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

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

A_{PJ} = Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m²)

A_{BL} = Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m²). For new reservoirs, this value is zero.

Since Aslancık HEPP is a Greenfield power plant, according to the applied methodology, Cap_{BL} and A_{BL} are zero. Thus, the project density is calculated as:

$$PD\left(\frac{W}{m^2}\right) = \frac{98{,}000{,}000\ W}{160{,}000\ m^2} = 612.5\ W/m^2$$

The project's reservoir area is about 160,000 m². The area of the reservoir is measured when the reservoir is full.

According to the methodology, "If the power density of the project activity is greater than 10 W/m^2: $PE_{HP,y}$ = 0." Since PD of Aslancık HEPP is 612.5 W/m^2, the project emissions are "0."

5.3 Leakage Emissions

ACM0002 describes this section as "The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected."

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

Therefore, the leakage emissions are quantified as "0."

(paragraph 46, pages 17).

[63] ACM0002 Version 22, Section 5.4.3 paragraph 46, equation (7)

5.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

According to ACM0002 Version 22, Section 5.7 paragraph 72, emission reductions are calculated as,

$$ER_y = BE_y - PE_y$$[64]

where

ER_y = Emission reductions in year y (t CO_2e/yr)

BE_y = Baseline emissions in year y (t CO_2e/yr)

PE_y = Project emissions in year y (t CO_2e/yr)

as,

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$[65]

and,

$$PE_y = 0$$

then, the emission reduction formula should be as follows:

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

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCUs (tCO_2e)
08-Mar-2024 to 31-Mar-2024	157,143	0	0	157,143	0	157,143
01-Jan-2025 to 31-Dec-2025	191,830	0	0	191,830	0	191,830

[64] ACM0002 Version 22.0 Section 5.7. paragraph 72 equation (17)

https://cdm.unfccc.int/UserManagement/FileStorage/R0IJ1X9LQ7W2GOYHSMBFCPE3VKZ685

[65] ACM0002 Version 22.0 Section 5.5 Paragraph 47 Equation (11)

01-Jan-2026 to 31-Dec-2026	191,830	0	0	191,830	0	191,830
01-Jan-2027 to 31-Dec-2027	191,830	0	0	191,830	0	191,830
01-Jan-2028 to 31-Dec-2028	191,830	0	0	191,830	0	191,830
01-Jan-2029 to 31-Dec-2029	191,830	0	0	191,830	0	191,830
01-Jan-2030 to 31-Dec-2030	191,830	0	0	191,830	0	191,830
01-Jan-2031 to 31-Dec-2031	191,830	0	0	191,830	0	191,830
01-Jan-2032 to 31-Dec-2032	191,830	0	0	191,830	0	191,830
01-Jan-2033 to 31-Dec-2033	191,830	0	0	191,830	0	191,830
01-Jan-2034 to 07-Mar-2034	34,687	0	0	34,687	0	34,687
Total	**1,918,300**	**0**	**0**	**1,918,300**	**0**	**1,918,300**

6 MONITORING

6.1 Data and Parameters Available at Validation

Below mentioned ex-ante parameter refers to approved 1st crediting period as per registered PDD available on the Project's VCS portal[66];

Data / Parameter	$FC_{HV,i,y}$
Data unit	*Tcal*
Description	Amount of fuel combusted for electricity production in Turkey in the years 2008-2010.
Source of data	[TEİAŞ Statistics]; http://www.teias.gov.tr/istatistik2010/front page 2010- çiçek kitap/yakıt46-49/49.xls
Value applied:	See Table C in Annex: Baseline Information of registered PDD for 1st crediting period.
Justification of choice of data or description of measurement methods and procedures applied	Data is necessary to calculate the OM emission factor, see equation (3) and equation (4) in Section 3.1.2 of registered PDD for 1st crediting period. Data source is published by state-owned company TEİAŞ.
Purpose of data	The data is utilized to calculate baseline emissions
Comments	NA

Data / Parameter	$EF_{CO2,i,y}$ / $EF_{CO2,i,m,y}$
Data unit	*tCO_2/TJ*
Description	*Carbon emission factors of fuels used for combustion for electricity production by fuel type (IPCC default values at the lower limit of the uncertainty at a 95% confidence interval)*
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories, table 1.4, pp. 1.23 and 1.24.
Value applied:	See Table 20 p, 33 Section 3.1.2. Step 4 of registered PDD of 1st CP for OM. See Table 23 p, 37 Section 3.1.2. Step 5 of registered PDD of 1st CP for BM.
Justification of choice of data or description of measurement methods and procedures applied	Data is necessary to calculate both OM and BM emission factors. See equation (3) p. 32 Section 3.1.2. Step 4 of registered PDD of 1st CP for OM. See equation (9) p. 37 Section 3.1.2. Step 5 of registered PDD of 1st CP for BM.

[66] https://registry.verra.org/app/projectDetail/VCS/917

	Data source is proposed and accepted by ACM0002.
Purpose of data	The data is utilized to calculate baseline emissions
Comments	NA

Data / Parameter	EI_y
Data unit	*GWh*
Description	*Gross electricity imports to the Turkish national grid 2008-2010*
Source of data	[TEİAŞ Statistics]; http://www.teias.gov.tr/istatistik2010/frontpage2010-çiçekkitap/uretim-tuketim(22-45)/23.xls
Value applied:	See Table 21 p. 34 Section 3.1.2. Step 4 of registered PDD for 1st Crediting period for OM.
Justification of choice of data or description of measurement methods and procedures applied	Data is necessary for calculating electricity generation from sources included in OM emission factor calculation, see equation (5) Section 3.1.2. Step 4 of registered PDD of 1st Crediting period. Data source is published by state-owned company TEİAŞ.
Purpose of data	The data is utilized to calculate baseline emissions
Comments	NA

Data / Parameter	$EG_{TOTAL,y,GROSS}$
Data unit	*GWH*
Description	*Gross electricity production in Turkey in 2008-2010.*
Source of data	[TEİAŞ Statistics]; http://www.teias.gov.tr/istatistik2010/frontpage2010-çiçekkitap/uretim-tuketim(22-45)/23.xls
Value applied:	See Table 21 p. 34 Section 3.1.2. Step 4 of registered PDD of 1st Crediting period for OM. See Table 22 p. 36 Section 3.1.2. Step 5 of registered PDD of 1st Crediting period for BM.
Justification of choice of data or description of measurement methods and procedures applied	Data is necessary as a basis for calculating OM generation, see equation (5) Section 3.1.2. Step 4 above. Data is also the basis for calculating the overall Turkish net-to-gross generation relation which is again necessary to estimate

	(i) net generation from sources not considered as low-cost/must-run for OM emission factor, see equation (6) Section 3.1.2. Step 4 of registered PDD of 1st Crediting period and (ii) net generation from sources added to the system most recently and representing 20% of total generation for BM emission factor, see equation (8) Section 3.1.2. Step 5 of registered PDD of 1st Crediting period. Data source is published by state-owned company TEİAŞ.
Purpose of data	The data is utilized to calculate baseline emissions
Comments	NA

Data / Parameter	$EG_{TOTAL,y,NET}$
Data unit	*GWh*
Description	*Net electricity production in Turkey in 2008-2010.*
Source of data	[TEİAŞ Statistics]; http://www.teias.gov.tr/istatistik2010/frontpage2010-çiçekkitap/uretim-tuketim(22-45)/33(84-10).xls
Value applied:	See Table 21 p. 34 Section 3.1.2. Step 4 of registered PDD of 1st Crediting period
Justification of choice of data or description of measurement methods and procedures applied	Data is the basis for calculating net-to-gross relation for Turkish electricity generation which is again necessary to estimate net generation from sources not considered as low-cost/must-run for OM emission factor, see equation (6) Section 3.1.2. Step 4 of registered PDD of 1st Crediting period. Net-to-gross generation relation is also necessary for estimating net generation from sources added to the system most recently and representing 20% of total generation for BM emission factor, see equation (8) Section 3.1.2. Step 5 of registered PDD of 1st Crediting period. Data source is published by state-owned company TEİAŞ.
Purpose of data	The data is utilized to calculate baseline emissions
Comments	NA

Data / Parameter	Capacity additions
Data unit	-

Description	*Power plants most recently added to the Turkish electricity system and representing 20% of total current (i.e. 2010) generation*
Source of data	http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2008.pdf For 2008: TEİAŞ: Türkiye elektrik enerjisi 10 yıllık üretim kapasite projeksiyonu (2009–2018); pp. 95-96. http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf For 2009: TEİAŞ: Türkiye elektrik enerjisi 10 yıllık üretim kapasite projeksiyonu (2010–2019); pp. 98-101. For 2010: [TEİAŞ Projection]; pp. 102-106.
Value applied:	See Table D in Annex: Baseline Information of registered PDD for 1st crediting period.
Justification of choice of data or description of measurement methods and procedures applied	Data is the basis for estimating net generation included in BM emission factor, see equation (8) Section 3.1.2. Step 5 above. Data sources are published by state-owned company TEİAŞ.
Purpose of data	The data is utilized to calculate baseline emissions
Comments	NA

Data / Parameter	$EG_{m,y,GROSS}$
Data unit	*GWh*
Description	*Annual gross generation of the power plants most recently added to the system and representing 20% of total current (i.e. 2010) gross generation in Turkey.*
Source of data	For EÜAŞ plants: [TEİAŞ Statistics] http://www.teias.gov.tr/istatistik2010/front page 2010-çiçek kitap/kguc(1-12)/9.xls; http://www.teias.gov.tr/istatistik2010/front page 2010-çiçek kitap/kguc(1-12)/10-11.xls For all other plants: [TEİAŞ Projection], pp. 90-101.
Value applied:	See Table 22 p. 36, Section 3.1.2. Step 5 of registered PDD of 1st crediting period
Justification of choice of data or description of measurement methods and procedures applied	Data is the basis for determining net generation of BM plants as included in the BM emission factor, see equation (8) Section 3.1.2. Step 5 of registered PDD of 1st crediting period.

	Net generation of BM emission plants is then used for estimating BM emissions as included in the BM emission factor, see equation (6) Section 3.1.2. Step 5 of registered PDD of 1st crediting period. Data sources are published by state-owned company TEİAŞ.
Purpose of data	The data is utilized to calculate baseline emissions
Comments	NA

Data / Parameter	$EG_{LC\text{-}MR,y,GROSS}$
Data unit	*GWh*
Description	*Gross electricity production from low-cost/must-run sources in Turkey 2008- 2010.*
Source of data	[TEİAŞ Statistics]; http://www.teias.gov.tr/istatistik2010/frontpage2010-çiçekkitap/uretim-tuketim(22-45)/23.xls
Value applied:	See Table 21 p. 34 Section 3.1.2. Step 4 of registered PDD of 1st crediting period for OM
Justification of choice of data or description of measurement methods and procedures applied	Data is necessary for calculating electricity generation from sources included in OM emission factor calculation, see equation (5) Section 3.1.2. Step 4 of registered PDD of 1st crediting period. Data source is published by state-owned company TEİAŞ
Purpose of data	The data is utilized to calculate baseline emissions
Comments	NA

Below mentioned ex-ante parameter refers to proposed 2nd Crediting period;

Data / Parameter	$EF_{grid,OM,y}$
Data unit	t CO_2/MWh
Description	Türkiye's Energy and Natural Sources Ministry's factsheet, including the most recent emission factor values calculations, has been used for the proposed project activity's OM factor.
Source of data	Türkiye's National Electric Grid Emission Factor https://rb.gy/m3mpp5 (PDF version has been shared.)
Value applied:	0.7279 t CO_2/MWh

Justification of choice of data or description of measurement methods and procedures applied	Data is retrieved from the Host Country's Energy and Natural Resources Ministry's official calculations.
Purpose of data	The data is utilized to calculate baseline emissions, which demonstrates the proposed project activity's contribution to SDG Target 13.2.
Comments	This parameter is fixed ex-ante for the second crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	t CO_2/MWh
Description	Türkiye's Energy and Natural Sources Ministry's factsheet, including the most recent emission factor values calculations, has been used for the proposed project activity's CM factor.
Source of data	Türkiye's National Electric Grid Emission Factor https://rb.gy/m3mpp5 (PDF version has been shared.)
Value applied:	0.3541 t CO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	Data is retrieved from the Host Country's Energy and Natural Resources Ministry's official calculations.
Purpose of data	The data is utilized to calculate baseline emissions, which demonstrates the proposed project activity's contribution to SDG Target 13.2.
Comments	This parameter is fixed ex-ante for the second crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	t CO_2/MWh
Description	Türkiye's Energy and Natural Sources Ministry's factsheet, including the most recent emission factor values calculations, has been used for the proposed project activity's CM factor.
Source of data	Türkiye's National Electric Grid Emission Factor https://rb.gy/m3mpp5 (PDF version has been shared.)
Value applied:	0.4475 t CO_2/MWh

Justification of choice of data or description of measurement methods and procedures applied	Data is retrieved from the Host Country's Energy and Natural Resources Ministry's official calculations. According to Tool 7's stipulations, the combined margin emission factor for the second crediting period should be calculated as: $$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}67$$ where, $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year y (t CO_2/MWh) $EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (t CO_2/MWh) w_{OM}= Weighting of operating margin emissions factor (per cent) w_{BM} = Weighting of build margin emissions factor (per cent) as, $$OM = 0.7279 \quad BM = 0.3541$$ $$w_{OM} = 0.25 \quad w_{BM} = 0.75$$ Thus, $$EF_{grid,CM,y} = 0.7279 \times 0.25 + 0.3541 \times 0.75$$ $$EF_{grid,CM,y} = 0.4475 \text{ t } CO_2 \text{/MWh}$$
Purpose of data	The data is utilized to calculate baseline emissions, which demonstrates the proposed project activity's contribution to SDG Target 13.2.
Comments	This parameter is fixed ex-ante for the second crediting period.

6.2 Data and Parameters Monitored

Below mentioned parameter is estimated ex-post parameter for 2nd crediting period.

Data / Parameter	**$EG_{facility,y}$**
Data unit	MWh/y
Description	Quantity of net electricity generation supplied by Aslancık HPP to the grid
Source of data	The data from the Electricity Meters are the basis for the settlement notification of EPİAŞ. Data are gathered electronically

[67] Tool 07 v.07, Section 6.6.1.

	from the meters by TEIAS and stored in secured website of EPİAŞ, which is accessible to project developer with a private password. For monitoring, web screenshots from EPİAŞ are used as source of data.
Description of measurement methods and procedures to be applied	Continuous measuring of electricity exported to and imported from the grid by Aslancık HPP, i.e., 100% of the data is monitored, and no sampling is applied.
Frequency of monitoring/recording	The electricity meters work continuously. Responsible TEİAŞ staff conducts data read-outs monthly and publishes results online in Aslancık Elektrik Üretim A.Ş.'s EPİAŞ account. Data is cross-checked and recorded monthly by responsible Aslancık HPP's staff.
Value monitored	428,624 MWh/y[68]
Monitoring equipment	Regarding the electricity meters: two meters were placed (one main and one reserve). The fact that two meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is in the interest of not only the emission reduction monitoring, but also paramount for the business relation between the plant operator and the electricity buyer. On the last day of each month, the production index is taken from the main as well as the reserve meter by EPİAŞ (a state institution responsible for electricity market settlement operations) via Automatic Meter Reading System (OSOS). In following month, EPİAŞ issue electricity generation records for each generation unit that can be accessed by plant operators via logging to secured website. These records are used to monitor net monthly generation of the power plant. For each month, the net electricity amount supplied to the grid is calculated by electricity fed into grid minus electricity withdrawn from the grid available in EPİAŞ records. On-site readings are used to cross-check the EPİAŞ records. TEİAŞ sends an electronic spreadsheet that includes daily and monthly electricity generation and withdrawn amounts for each power plant. Thus, cross-check source is the on-site meter readings.

[68] Please refer to Appendix 1 for the data's details.

Since the meters are reading electricity supplied to the system and withdrawn from the system separately, the net electricity amount supplied to the grid is calculated by electricity supplied minus electricity withdrawn. Thus, with this procedure, monitoring is sufficient and no extra monitoring has to be implemented.

The above-described measurement method follows Article 81 of the official regulation "Electricity Market Balancing and Settlement Regulation".

The specification of electricity meters is provided in table given below. All meters were manufactured in 2021. Because the power plant has two units, there is a main and backup meter for both units; making the total meter number 4 (four).

Table 18 Specifications of current meters[69]

Name	Brand & Model	Serial Number	Accuracy Class	Installation Date
Main Meter 1	EMH & LZQJ - XC	11172808	1S	22-Mar-2022
Back-up Meter 1	EMH & LZQJ - XC	11172809	1S	
Main Meter 2	EMH & LZQJ - XC	11172810	1S	
Back-up Meter 2	EMH & LZQJ - XC	11172811	1S	

The meters were installed on 22-Mar-2022, where they were tested and calibrated by experts and approved by TEİAŞ. Per the relevant regulation, the meters need to be replaced in 10 years, until 22-Mar-2032. Calibration is done during installation.

Information for the previous meters is provided below.

Table 19 Specifications of former meters[70]

Name	Brand & Model	Serial Number	Accuracy Class	Installation Date
Main Meter 1	ELSTER A1500	464256	0.5S	23-Oct-2013
Back-up Meter 1	ELSTER A1500	464257	0.5S	23-Oct-2013

[69] Please see "Sayaç Değiştirme ve İlk Endeks Protokolü"

[70] Please see "Sayaç Değiştirme ve İlk Endeks Protokolü"

	Main Meter 2	ELSTER A1500	471006	0.5S	08-Mar-2014
	Back-up Meter 2	ELSTER A1500	471007	0.5S	08-Mar-2014
QA/QC procedures to be applied	The calibration of the meters is conducted every 10 years but per the system usage agreement, TEİAŞ carries out periodic tests for every two years. The latest tests for the former meters were conducted on 18-Sep-2020. The newly installed meters were installed and calibrated on 22-Mar-2022.The most recent TEİAŞ test of the meters took place on 31-May-2024.[71] Technicians, employees of Aslancık HES conduct readings from two meters from the project site and sends it to TEIAŞ. By this wa/y, a cross-check is done. Moreover, continuously these two meters are compared with each other and if any differences are detected the necessary control measures are taken. According to the Article 2 of the Communiqué: 'The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained "Type and System Approval" certificate from the Ministry of Trade and Industry.' Therefore, Ministry of Trade and Industry (Ministry) is responsible from control and calibration of the meters. Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems' 7 (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.				
Purpose of the data	Calculation of baseline emissions				
Calculation method	The net electricity is calculated by: i. Subtracting self-consumption value from gross generation value for each month to find the net electricity supplied to the grid. ii. Adding up all monthly net electricity values to calculate the total net electricity supplied to the grid during the monitoring period.				

[71] Please See "Meter Test Protocol 2024"

	Multiplying the total net electricity value with the CM emission factor.
Comments	Provide any additional comments

Data / Parameter	Cap_{PJ}
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data	Energy Market Regulatory Authority (EMRA) website, turbine plates
Description of measurement methods and procedures to be applied	The EMRA website[72] contains all licensed electricity generation facilities, along with their current installed capacities. Further, the turbine plates installed at site are also proof of capacity.
Frequency of monitoring/recording	Yearly
Value monitored	120 MWm/98 MWe
Monitoring equipment	Not applicable
QA/QC procedures to be applied	Not applicable
Purpose of the data	Compliance with applied methodology, and power density calculations.
Calculation method	Not applicable
Comments	-

Data / Parameter	A_{PJ}
Data unit	m^2
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data	Project Site
Description of measurement methods	Measured from topographical surveys and maps

[72] https://lisans.epdk.gov.tr/epvys-web/faces/pages/lisans/elektrikUretim/elektrikUretimOzetSorgula.xhtml

and procedures to be applied	
Frequency of monitoring/recording	To be monitored at each crediting period renewal
Value monitored	160,000
Monitoring equipment	Measured from topographical surveys, maps, satellite pictures
QA/QC procedures to be applied	Not applicable
Purpose of the data	Compliance with applied methodology, and power density calculations.
Calculation method	Measured from topographical surveys, maps, satellite pictures
Comments	-

6.3 Monitoring Plan

Monitoring is a key procedure to verify the proposed project's real and measurable emission reductions. The monitoring plan has been established to guarantee the proposed project's real, measurable and long-term GHG emission reductions.

The monitoring plan for Aslancık HPP has been done in line with the applied methodology, which is ACM0002. In line with the information provided in Section 6.2., the only parameter that was available for monitoring between 01-May-2022 and 07-Mar-2024 was electricity supplied to the grid per year, which is denominated with EGfacility,y. As per the methodology, TEİAŞ has installed one main electricity meter and one back-up electricity meter at the substation to which Aslancık HPP power plant is connected. The fact that two meters are installed for each unit keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is in the interest of not only the emission reduction monitoring, but also paramount for the business relation between the plant operator and the electricity buyer. The former electricity meters, details provided below, were replaced in 22-May-2022 as their 10-year period for change had come. The latest tests for the former meters were conducted on 18-Sep-2020.

Table 20 Aslancık HPP former meters

Name	Brand	Model	Serial Number	Accuracy Class	First Index Protocol Date
Main Meter 1	ELSTER	A1500	464256	0,5S	23-Oct-2013
Back-up Meter 1	ELSTER	A1500	464257	0,5S	23-Oct-2013
Main Meter 2	ELSTER	A1500	471006	0,5S	08-Apr-2014
Back-up Meter 2	ELSTER	A1500	471007	0,5S	08-Mar-2014

After the first index protocol, the former meters were subjected to TEİAŞ tests on 02-Oct-2014, 27-Oct-2015, 10-Oct-2017 and 18-Sep-2020. The newly installed electricity meters have 1S accuracy level and have been installed and calibrated by TEİAŞ on 22-Mar-2022. The latest tests for the new meters were performed on 31-May-2024. Details of the new meters are provided in the table below.

Table 21 Aslancık HPP current meters

Name	Brand	Model	Serial Number	Accuracy Class	First Index Protocol Date
Main Meter 1	EMH	LZQJ - XC	11172808	1S	22-Mar-2022
Back-up Meter 1	EMH	LZQJ - XC	11172809	1S	
Main Meter 2	EMH	LZQJ - XC	11172810	1S	
Back-up Meter 2	EMH	LZQJ - XC	11172811	1S	

TEİAŞ performs read-out on these electricity meters at 00:00 of the first day of each month and calculate monthly net electricity fed into the grid. Upon performing monthly data read out on the primary data source, i.e., main electricity meter located at the substation, TEİAŞ publishes the results online on the EPİAŞ website.

The EPİAŞ website is accessible to the project proponent with their unique user ID and password. The project owner can access and monitor the electricity generation data 24 hours a day. Once accessed, the project owners are able to call electricity generation and consumption reports of their own projects. The same reports are used by them for invoicing purposes. The electricity generation data are reported on a monthly basis. The data can be reached after the 15th day of the following month. The procedure involves accessing the website and then the electricity generation and consumption data for each month covering the monitoring period, and taking screenshots of the data.

At the end of the monitoring period, the sum of data from the monthly readings by EPİAŞ will be transferred to an excel sheet, which will also include the Combined Margin (CM) emission factor. All data monitored under the monitoring plan will be kept in electronic form and hard copy for 2 years after the end of the crediting period. This way the baseline approach will be as transparent as possible.

As the project owner, Aslancık Elektrik Üretim A.Ş. is responsible for running the HPP and compliance with the VER monitoring plan, storing data about power sales, invoicing and purchasing. It is also responsible for electrical operations and recording and monitoring of relevant data and periodic reporting.

For the elaboration and quality assurance of the monitoring report, Life İklim ve Enerji Ltd. Şti., an expert in the project mechanisms who already supported the project design, is assigned. The

company is responsible for emission reduction calculations, preparing monitoring reports, and periodical verification process.

7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

Below mentioned parameter is actual ex-post parameter for monitoring period under 1st crediting period.

Data / Parameter	$EG_{facility,y}$
Data unit	MWh/y
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Value applied:	563,847.46 (for this monitoring period)
Comments	Not applicable

7.2 Baseline Emissions

According to ACM0002, "baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity."[73] The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated via the following formula:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$[74]

where,

BE_y = Baseline emissions in year y (t CO_2/yr)

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

[73] ACM0002 Version 22 Section 5.5 paragrapgh 47
https://cdm.unfccc.int/UserManagement/FileStorage/R0IJ1X9LQ7W2GOYHSMBFCPE3VKZ685

[74] ACM0002 Version 22 Section 5.5 paragrapgh 47 equation 11

$EF_{grid,CM,y}$ = 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" (t CO_2/MWh)"

The calculation of EGPJ,y is different for Greenfield plants, retrofits and replacements, and capacity additions. If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

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

where,

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

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

7.3 Project Emissions

The proposed project activity involves the generation of electricity by development of a hydro power plant. The generation of electricity does not result in greenhouse gas emissions and therefore is taken as 0 tCO_2e/year. [75]

7.4 Leakage Emissions

Leakage emissions are neglected and assumed as zero as per the Methodology.

7.5 GHG Emission Reductions and Carbon Dioxide Removals

According to ACM0002, emission reductions are calculated as,

$$ER_y = BE_y - PE_y$$ [76]

where

ER_y = Emission reductions in year y (t CO_2e/yr)

BE_y = Baseline emissions in year y (t CO_2e/yr)

[75] ACM0002 Version 22, Section 5.4.1, Para. 42.

https://cdm.unfccc.int/UserManagement/FileStorage/R0IJ1X9LQ7W2GOYHSMBFCPE3VKZ685

[76] ACM0002 Version 22 Section 5.7 paragraph 72 equation (17)

PE_y = Project emissions in year y (t CO_2e/yr)

as,

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

and,

$$PE_y = 0^{77}$$

then, the emission reduction formula should be as follows:

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

Calculated emission factors for 2010 from the ministry's factsheet are provided below. (considered in Registered PD of First Crediting Period).

OM=0.653

BM=0.314

CM=0.533

Nevertheless, the CM value the ministry provided is only valid for the first crediting period. Per Tool 7's specifications, renewable energy projects – except for wind and solar – must use the following weighting of OM and BM factors for the CM factor's calculation.

According to ACM0002, version 12.3 and Tool 7 Version 02.2.1, specifications, renewable energy projects – except for wind and solar ones – should calculate the CM factor for the second and third crediting period by taking w_{OM} as 0.5 and w_{BM} as 0.5.

Thus, the CM factor for the First crediting period should be calculated as 0.533, by using the ministry's BM and OM values and the respective weights per the applicable methodology at time of Project registration of First Crediting Period.

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

$$\mathrm{EF_{grid,CM,y}} = \mathrm{EF_{grid,OM,y}} \times \mathrm{w_{OM}} + \mathrm{EF_{grid,BM,y}} \times \mathrm{w_{BM}}^{78}$$

[77] ACM0002 Version 12.3.

[78] Tool 07 Version 02.2.1

Vintage period	Baseline emissions (tCO_2e)	Project emissions (tCO_2e)	Leakage emissions (tCO_2e)	Reduction VCUs (tCO_2e)	Removal VCUs (tCO_2e)	Total VCUs (tCO_2e)
01-May-2022 to 31-May-2022	102,735	0	0	102,735	0	102,735
01-Jan-2023 to 31-Dec-2023	162,545	0	0	162,545	0	162,545
01-Jan-2024 to 07-Mar-2024	35,247	0	0	35,247	0	35,247
Total	**300,527**	**0**	**0**	**300,527**	**0**	**300,527**

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

Section	Information	Justification
Not applicable	There are no commercially sensitive information.	Not applicable

APPENDIX 2: MONTHLY ELECTRICITY GENERATION

EPİAŞ DATA			
Months	Electricity supplied to the grid (MWh) (1)	Electricity consumption from the grid (MWh) (2)	Net electricity supplied to the grid[MWh] (3) =(1)-(2)
May-2022	46,314.46	32.27	46,282.19
Jun-2022	38,789.62	40.48	38,749.14
Jul-2022	25,519.07	48.39	25,470.68
Aug-2022	26,369.38	50.03	26,319.35
Sep-2022	25,457.37	42.43	25,414.95
Oct-2022	10,428.15	57.04	10,371.12
Nov-2022	7,605.79	61.26	7,544.53
Dec-2022	12,676.71	78.83	12,597.89
Sum 2022	193,160.54	410.71	192,749.83
Jan-2023	8,417.33	92.69	8,324.64
Feb-2023	8,029.87	84.72	7,945.14
Mar-2023	24,336.97	70.02	24,266.96
Apr-2023	45,903.06	42.65	45,860.41
May-2023	57,047.92	22.23	57,025.68
Jun-2023	51,318.03	24.98	51,293.06
Jul-2023	30,374.34	54.43	30,319.92
Aug-2023	23,743.57	43.50	23,700.08
Sep-2023	16,461.05	61.34	16,399.71
Oct-2023	18,211.93	68.91	18,143.01
Nov-2023	8,301.42	67.23	8,234.19
Dec-2023	13,533.31	77.02	13,456.29
Sum 2023	305,678.80	709.71	304,969.09
Jan-2024	22,409.88	84.02	22,325.86
Feb-2024	21,007.64	85.30	20,922.33
Mar-2024	22,971.20	88.91	22,882.29
Sum 2024	66,388.72	258.23	66,130.49
Total Sum	565,228.05	1,378.64	563,849.41

Monthly Meter Reading Values			
Months	Electricity supplied to the grid (MWh) (1)	Electricity consumption from the grid (MWh) (2)	Net electricity supplied to the grid[MWh] (3) =(1)-(2)
May-2022	46,314.00	32.00	46282
Jun-2022	38,790.00	40.00	38750
Jul-2022	25,519.00	48.00	25471
Aug-2022	26,369.00	50.00	26319
Sep-2022	25,457.00	42.00	25415
Oct-2022	10,428.00	57.00	10371
Nov-2022	7,606.00	61.00	7545
Dec-2022	12,675.00	77.00	12598
Sum 2022	193,158.00	407.00	192751
Jan-2023	8,417.00	93.00	8324
Feb-2023	8,030.00	85.00	7945
Mar-2023	24,337.00	70.00	24267
Apr-2023	45,903.00	43.00	45860
May-2023	57,048.00	22.00	57026
Jun-2023	51,318.00	25.00	51293
Jul-2023	30,374.00	54.00	30320
Aug-2023	23,744.00	43.00	23701
Sep-2023	16,461.00	61.00	16400
Oct-2023	18,212.00	69.00	18143
Nov-2023	8,301.00	67.00	8234
Dec-2023	13,527.00	74.00	13453
Sum 2023	305,672.00	706.00	304966
Jan-2024	22,409.88	84.05	22325.83
Feb-2024	21,007.64	85.30	20922.34
Mar-2024	22,971.20	88.91	22882.29
Sum 2024	66,388.72	258.26	66130.46
Total Sum	**565,218.72**	**1,371.26**	**563847.46**