Gold Standard
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TEMPLATE

KEY PROJECT INFORMATION & PROJECT DESIGN DOCUMENT (PDD)

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VERSION **v. 1.2**

RELATED SUPPORT

- **TEMPLATE GUIDE Key Project Information & Project Design Document v.1.2**

This document contains the following Sections

KEY PROJECT INFORMATION

GS ID of Project	663
Title of Project	Aralık HEPP
Time of First Submission Date	05/07/2022
Date of Design Certification	18/11/2011
Version number of the PDD	05
Completion date of version	16/07/2024
Project Developer	Reşadiye Hamzalı Elektrik Üretim San. Ve Tic. A.Ş.
Project Representative	Life İklim ve Enerji LTD. ŞTİ.
Project Participants and any communities involved	N/A
Host Country (ies)	Turkey
Activity Requirements applied	☐ Community Services Activities ☒ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Scale of the project activity	☐ Micro scale ☒ Small Scale ☐ Large Scale
Other Requirements applied	N/A
Methodology (ies) applied and version number	AMS-I.D.: Grid connected renewable electricity generation (Version 18.0)
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A
Project Cycle:	☐ Regular ☒ Retroactive

Table 1 – Estimated Sustainable Development Contributions

Sustainable Development Goals Targeted	SDG Impact (defined in B.6.)	Estimated Annual Average	Units or Products
13 Climate Action (mandatory)	Emission Reductions	22,254	t CO_2e
7 Affordable and Clean Energy	Energy Generation	45,150	MWh
8 Decent Work and Economic Growth	Employees	15	Number of employees

SECTION A. DESCRIPTION OF PROJECT

A.1 Purpose and general description of project

Aralık HEPP (referred to as the "*project*" from here on) is a hydroelectrical power generation project with the installed capacity of 12.41 MWe. The project was built and developed by Reşadiye Hamzalı Elektrik Üretim San. Ve Tic. A.Ş. (referred to as the "*project owner*" from here on) in Turkey's Black Sea province of Artvin.

Aralık HEPP utilizes water in motion to produce electricity. It consists of a run-of-the-river system that generates 45.15 GWh of electricity per year. The project generates energy from the running waters of the Aralık Creek and includes a weir, upstream and downstream cofferdams, spillway, conveyance tunnel and powerhouse with turbines and generators. Total length of the conveyance line will be about 2,767 m long with a 2,682 m long water conveyance tunnel and an 84.55 m long inlet canal whereas design flow rate of the project is 5.00 m^3/s and elevation difference of about 300.00 m.

The main purpose of the proposed project activity is to generate electrical energy through sustainable sources, hydro power in this case, and feed the generated electricity to the Turkish national grid; thereby contributing to the country's predominantly fossil-fuel sourced energy industry. The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system.

By displacing part of the power generated by thermal power plants, the average annual emission reductions in the second crediting period have been calculated as 22,254 t CO_2e.

As aforementioned, the project will help Turkey to stimulate and commercialize the use of grid connected renewable energy technologies and markets. Furthermore, the project will demonstrate the viability of grid connected hydro plants which can support improved energy security, improved air quality, alternative sustainable energy futures, improved local livelihoods and sustainable renewable energy industry development. The specific goals of the project are to:

- reduce greenhouse gas emissions in Turkey compared to the business-as-usual (BAU) scenario,
- help to stimulate the growth of the renewable energy industry in Turkey,
- create local employment during the construction and the operation phase of the plant,
- reduce other pollutants resulting from power generation industry in Turkey, compared to a BAU scenario,
- help to reduce Turkeys increasing energy deficit,
- and differentiate the electricity generation mix and reduce import dependency.

The project has been registered under the Gold Standard with the ID 663. The first crediting period of the project took place from 01/05/2010 to 30/04/2017. The project was registered for a twice-renewable 7-year crediting period, amounting to a total of 21 years. The second crediting period will start from 01/05/2017 to 30/04/2024.[1]

A.1.1. Eligibility of the project under Gold Standard

The project activity meets the eligibility criteria as per section 3.1.1 of GS4GG Principles & Requirements Version 1.2.[2] as described below:

[1] The start date of the issuance of credits will be the date the project documents will be submitted to SustainCert, per GS4GG rules.
[2] GS4GG Principles & Requirements, Version 1.2, Section 3 & Section 4.
https://globalgoals.goldstandard.org/standards/101_V1.2_PAR_Principles-Requirements.pdf

- The project applies Gold Standard approved CDM methodology AMS-I.D, Version 18,
- The project utilizes hydro power for renewable energy generation that is supplied to the national grid, which is deemed eligible according to Article 2.1.2 of Renewable Energy activity requirements Version 1.4.
- The project generates and delivers energy services from renewable sources, that is hydropower.
- The project generates electricity from hydro power and supplies it to the national grid of Turkey.
- The project is not registered with any other voluntary or compliance schemes.
- The project is located in Turkey's Black Sea province of Artvin. Turkey does not implement any emission reduction cap or has an emission trade scheme.
- The project has no potential for double counting of impacts if the Project Area overlaps with that of another Gold Standard or other voluntary or compliance standard programme of a similar nature.
- The project has been and currently is in compliance with Turkey's legal, environmental, ecological and social regulations.

General Eligibility Criteria under Renewable Energy Activity Requirements Project Type: As discussed above, the project type is eligible.[3]

A.1.2. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

The project owner (Reşadiye Hamzalı Elektrik Üretim San. Ve Tic. A.Ş.) has full and uncontested legal ownership of the emission reductions that are generated under this Gold Standard project, and has legal rights concerning changes in use of resources required to service the project.

[3] GS4GG Renewable Energy Activity Requirements Version 1.4, Section 2. https://globalgoals.goldstandard.org/standards/202_V1.4_AR-Renewable-Energy-Activity-Requirements.pdf

A.2 Location of project

The project is located in Artvin's Borçka district in northeastern Turkey. It is located on the Aralık Creek of the Çoruh River. The project site can be accessed via a 10-kilometer-long paved road in Borçka or a 45-kilometer-driveway from Artvin. The coordinates of the project are as follows:

Table 1. Coordinates of Aralık HEPP project components

	Latitude (DMS)	Longitude (DMS)
Weir	41°23'53" N	41°44'06" E
Powerhouse	41°23'36" N	41°41'49" E

Figure 1. Map of Project Site

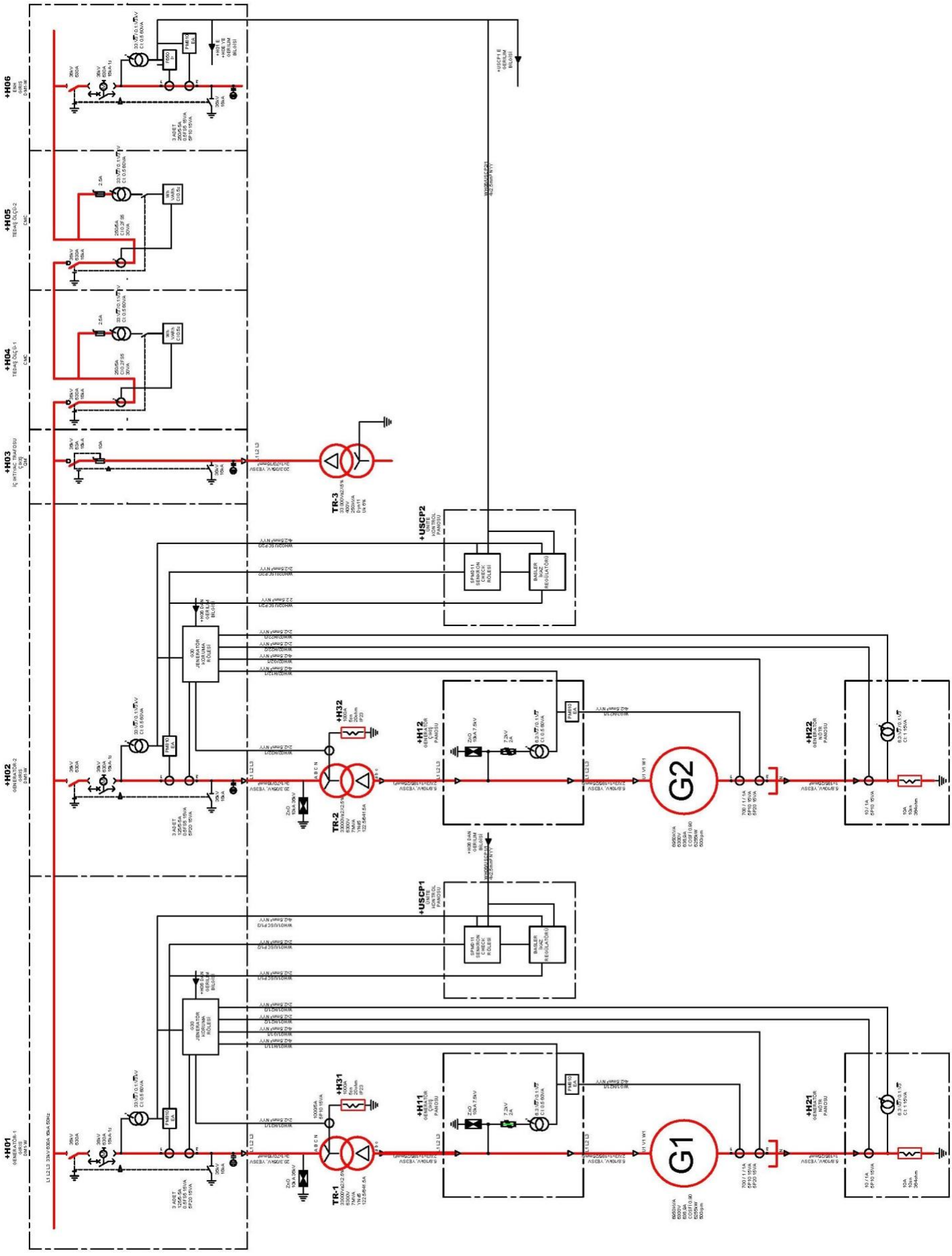
A.3 Technologies and/or measures

The project aims to generate energy from the 300 meters fall on Aralık Creek 1 km. upstream before the river merges with Çoruh River. The project maintains steady flow of water to the river to ensure the natural life is unaffected.

The 2682 m tunnel enables water flow at a 5.0 m^3/sec to the turbine, and the water is released to the river without a change in the chemical composition. The annual electricity energy generation is estimated at 45.15 GWh.

Aralık HEPP Project is classified as a run-of-river type HEPP and consists of a regulator, conveying channel, penstock, power generation turbines, office buildings and switchgear area. For the project, only an abandoned house and the land around weir have been used.

Figure 2. Aralık HEPP single line diagram


+H06
+H05
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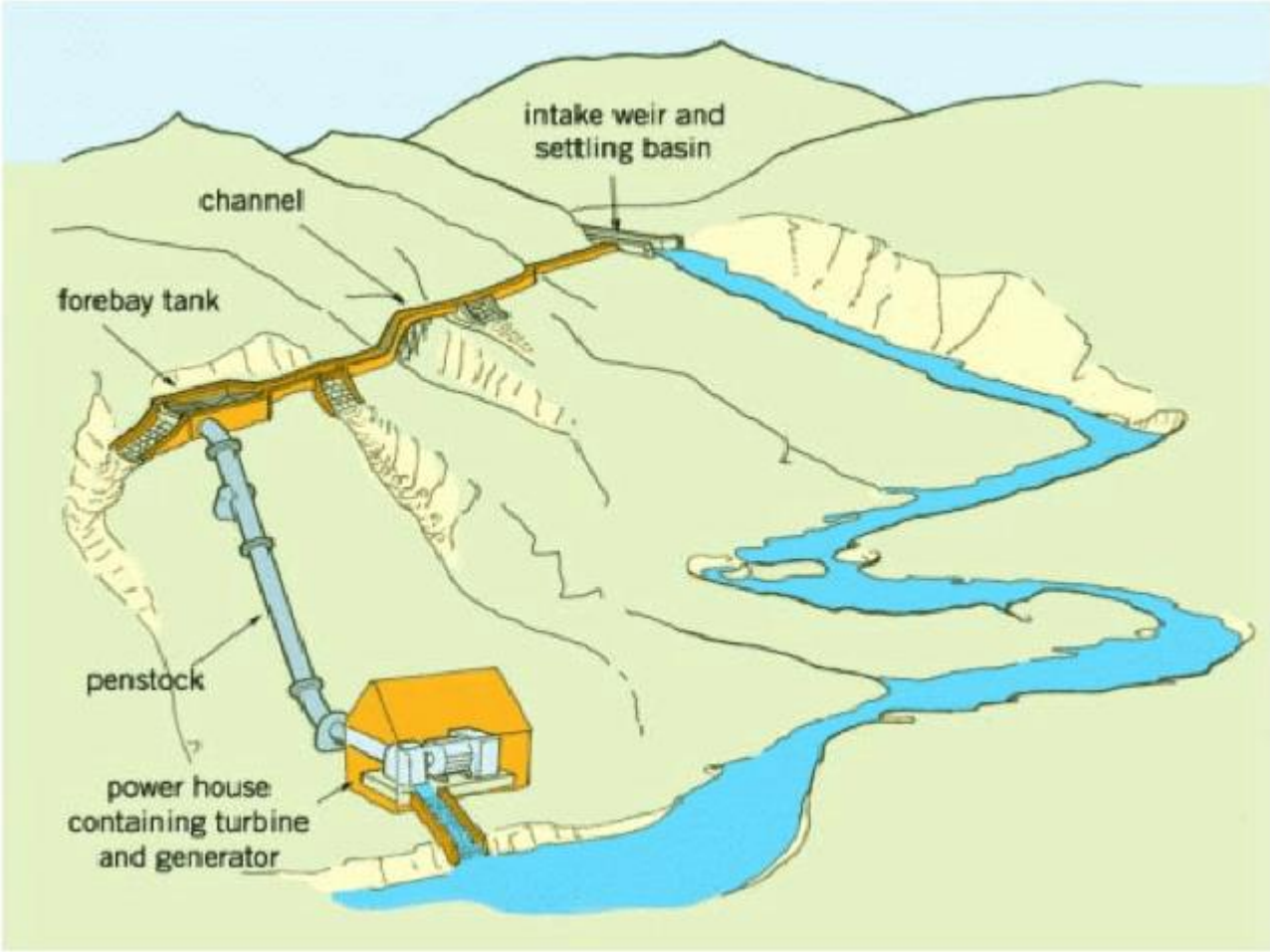
+H02
+H01
+USCP2
+USCP1
TR-3
TR-2
TR-1
+H32
+H31
+H12
+H11
+H22
+H21
G2
G1

Run-of-river type hydroelectric power plants do not have significant storage capacity on the contrary to plants with dam and storage facility. Therefore, electricity generation in river type HEPPs depend on flow regime of the river. Whenever the water is available the hydroelectric power plant generates electricity and when there is no water no power is generated. During rainy seasons when there is maximum flow of water available in the rivers, they produce maximum power. These types of hydroelectric power plants produce the power continuously only as long as flowing water is available.

Figure 3. Typical layout of a small run-of-river hydropower plant[4]



The table below provides technology details for Aralık HEPP.

[4] Mbaka, John & Mwaniki, Mercy. (2017). Small Hydro-power Plants in Kenya: A Review of Status, Challenges and Future Prospects. Journal of Renewable Energy and Environment. 3. 20-26.

Table 2. Technical characteristics

Plant Characteristics	
Type	Channel type
Channel Length	2,873 m
Design Discharge	5.00 m^3/sec
Total Installed Capacity	12.41 MW
Powerhouse Characteristics	
Turbine	
Manufacturer	VA Tech Bouvier Hydro (Andritz)
Serial No.	07H017-2
Nominal Head	292.23 m
Nominal Flow	2.5 m^3/s
Type	Horizontal Pelton type
Power	2 each x 6,450 kW
Generator	
Manufacturer	Indar Electric S.L.
Type	LSA-1120 L/12
Power	2 each x 6,950 kVA
Cosφ	0.9
Voltage	6300 V
Current	636,9 A
Transformer	
Manufacturer	ABB Elektrik (Turkey)
Type	TSPH 09020/900
Serial No.	1 LTR0000167
Power	2 each x 7,000 kVA
Hydrology	Regular regime with high seasonal precipitation in the form of rain
Annual Energy Generation	
Firm Energy	-
Secondary Energy	-
Total Energy	45.15 GWh

Switchyard	34.5 kV switchgear equipment, 6.3/34.5 kV power transformer and 5.0 km long 34.5 kV capacity overhead transmission line for connection to the national grid
Commencement of Operation	30/04/2010
License Duration	49 years

A.4 Scale of the project

The project is a small scale one; in line with Renewable Energy activity requirements Section 3.3., which defines small scale as "Renewable energy Project with a maximum output capacity of 15 MW." Since the project activity consists of 12.41 MW of installed capacity, it is a small-scale project.

A.5 Funding sources of project

The project activity does not have any public funding or Official Development Assistance (ODA) funding. The project is financed by the project owner. It is owned by Reşadiye Hamzalı Elektrik Üretim San. Ve Tic. A.Ş. Hence, the GS VERs generated by the proposed project activity will be owned by the project owner.

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES) AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

B.1. Reference of approved methodology (ies)

The United Nations approved consolidated baseline and monitoring methodology applicable to this project is "Small-scale Methodology for Grid connected renewable electricity generation," Version 18[5], valid as of 28/11/2014 (referred to as *AMS-I.D* from here on).

"AMS-I.D refers to the following tools:

[5] AMS-I.D.: Small-scale Methodology for Grid connected renewable electricity generation, Version 18, (AMS-I.D. v.18) https://cdm.unfccc.int/UserManagement/FileStorage/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC

(a) "Project emissions from cultivation of biomass";
(b) "ACM0002: Grid-connected electricity generation from renewable source";
(c) "AMS-I.A.: Electricity generation by the user";
(d) "AMS-I.C.: Thermal energy production with or without electricity";
(e) "AMS-I.F.: Renewable electricity generation for captive use and mini-grid";
(f) "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion";
(g) "Tool to calculate the emission factor for an electricity system";
(h) "Tool to determine the remaining lifetime of equipment";
(i) "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period"."[6]

Since (a), (b), (c), (d), (e), (f) and (i) are not applicable for the proposed project activity, only (g) "Tool to calculate the emission factor for an electricity system[7]" and (h) "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period[8]" have been considered.

The proposed project activity also utilizes "Tool for the demonstration and assessment of additionality," Version 07[9] as it's use is referred to in the methodology. In the tool, the Section "Scope, applicability and entry into force" states:

"The document provides a general framework for demonstrating and assessing additionality and is applicable to a wide range of project types."

[6] AMS-I.D. v.18, Section 3
[7] Tool to calculate the emission factor for an electricity system, Version 07.0 (Tool 07 v.07) https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[8] 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 (Tool 11 v.03.0.1) https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf
[9] See Tool 01 Version 7, https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf [Tool01 v.07]

As the project type is per AMS-I.D. and it refers to ACM0002 while ACM0002 also refers to the "Tool for the demonstration and assessment of additionality," the latter can be considered applicable.

B.2. Applicability of methodology (ies)

As the project's installed capacity is under 15MW, it is considered a small-scale project per CDM rules, justifying the decision to use the small-scale AMS-I.D methodology. The applicability criteria and conditions are discussed in detail in the table below:

Table 3. Applicability of AMS-I.D for Aralık HEPP

Ref.	Applicability Criteria	Justification
1	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 plant(s)/unit(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	Applicable. The project activity involves installation of a Greenfield power plant.
2	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology, (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m^2 (c) The project activity results in new reservoirs and the power density of the	Not applicable. The project does not cause any new reservoir formation.

	power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.	
3	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	Not applicable. The project is a hydro power plant without nonrenewable components (e.g. a wind/diesel unit).
	Combined heat and power (co-generation) systems are not eligible under this category.	Not applicable. The project is a hydro power plant and do not involve the combined heat and power (co-generation) systems
4	In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	Not applicable. The project does not involve the capacity addition of renewable energy generation units at an existing renewable power generation facility.
5	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	Not applicable. The project is not retrofit, rehabilitation, replacement, or capacity addition project. Therefore, this item is not applicable.
6	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered	Not applicable.

	methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	The project is a hydro power project.
7	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	Not applicable. The project is a hydro power project.

As the project type is per AMS-I.D, and at the same time AMS-I.D refers to Tool 07, the latter can be considered applicable. The Section "Scope, applicability and entry into force" in Tool 07 states:

> "This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects)."[10]

This condition is applicable. OM, BM and CM are utilized for calculating baseline emissions.

The tool also elaborates on the emission factor calculations by stating that "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." Since the project activity is

[10] Tool 07 v.07, Section 2.2.

grid connected, this condition is applicable, and the emission factor has been calculated accordingly. Furthermore, according to the tool, "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." The project activity takes place in an Annex I country, yet this condition is not applicable, and the project is not a CDM project.

On the other hand, Tool 11 states that:

> "This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism."[11]

Because the proposed project activity is in the process of renewing its crediting period, Tool 11 shall also be applied to the PDD. The baseline is assessed with directives provided with this tool.

Furthermore, as mentioned in Section B.1., the proposed project activity also utilizes Tool 01. In the tool, the Section "Scope, applicability and entry into force" states:

> "The document provides a general framework for demonstrating and assessing additionality and is applicable to a wide range of project types."

As the project type is per AMS-I.D. and it refers to ACM0002 while ACM0002 also refers to Tool 01, the latter can be considered applicable. The tool also elaborates on the steps that need to be demonstrated to show additionality, which includes investment and common practice analyses. However, since the proposed project activity entails the renewal of design certification, investment and common practice analyses are not required for this project description document.

[11] Tool 11 v.03.0.1, Section I.

B.3. Project boundary

According to AMS-I.D, the project boundary "includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to."[12] In the case of Aralık HEPP, the electricity generated at the plant is connected to Turkey's national electricity grid, which is considered as the project boundary.

Figure 4. Map of Turkey's national grid[13]

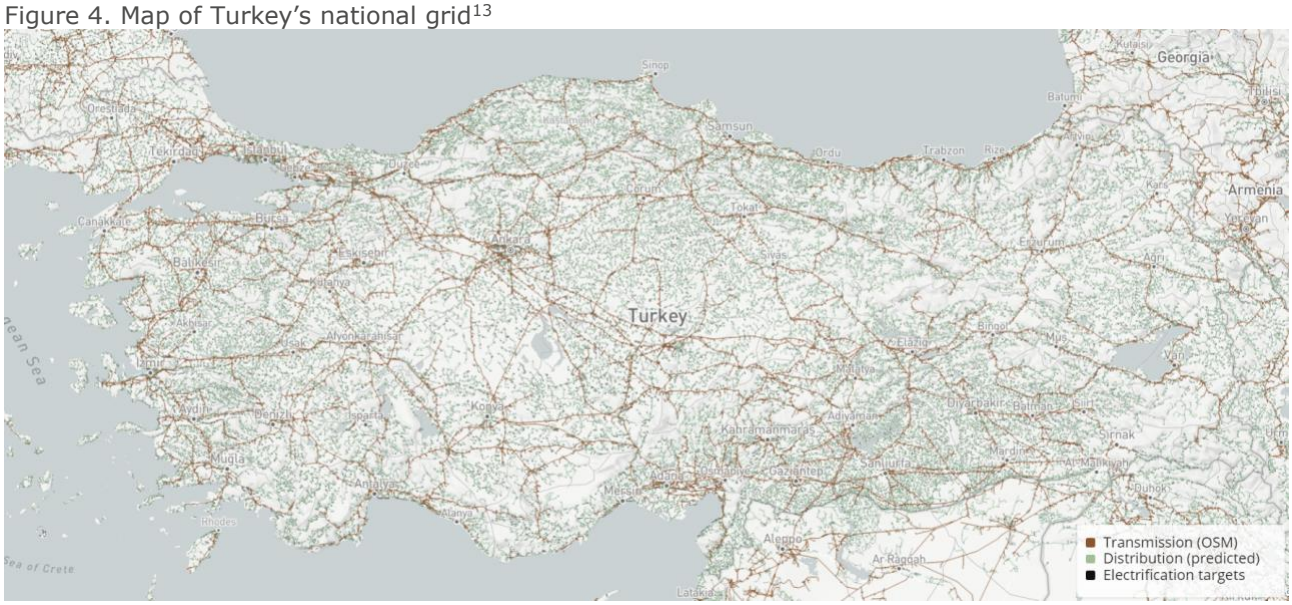


Table 4. Emission sources included in or excluded from the project boundary[14]

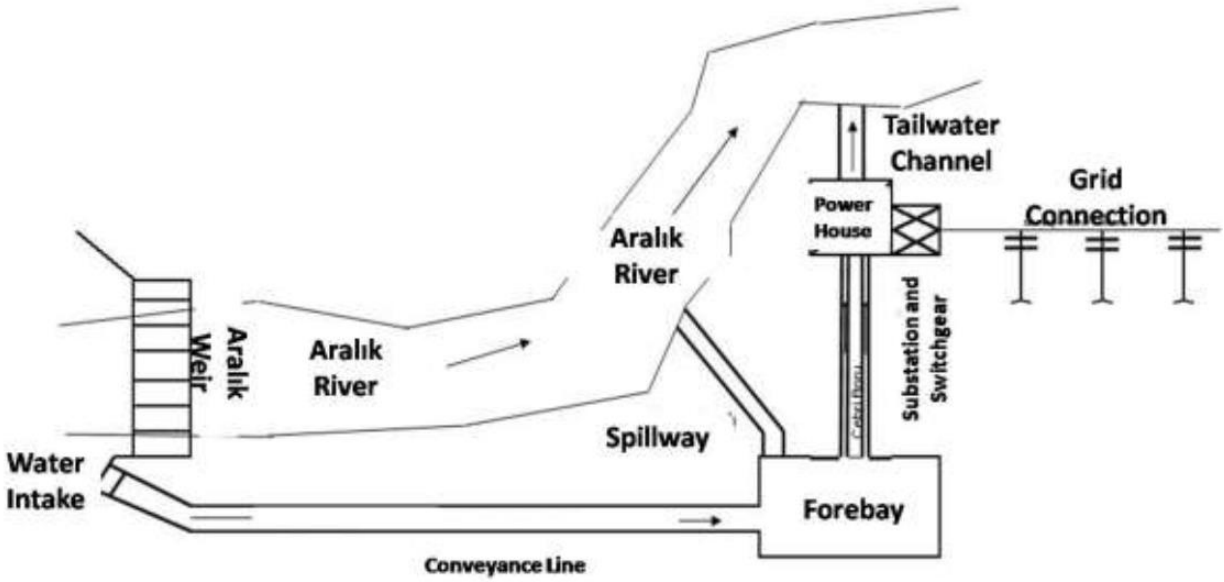
Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	For hydro power plants, emissions of CH_4 from	CO_2	No	Minor emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

[12] AMD-I.D v.18, Section 5.1.
[13] https://gridfinder.org/
[14] ACM0002 v.20, Section 5.1.
https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO

	the reservoir			

The figure below provides an insight to the operating characteristics of the project activity.

Figure 5. Aralık HEPP schematic layout



B.4. Establishment and description of baseline scenario

The baseline scenario is formulated in AMS-I.D as follows:

"The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid."[15]

To calculate the GHG emission reductions, one would need BM, OM, and CM emission factor values per the Tool 7. Because the project activity's last monitoring report was issued more than 5 years ago, the emission factor values calculated in the said document have lost their validity. Since Turkey's Energy and Natural Resources Ministry

[15] AMS-I.D, v.18 Section 5.2.1.

began to publish factsheets containing emission factors' values, it is required to use the official values and update the baseline accordingly.

Hence, in accordance with AMS-I.D, the baseline scenario should be updated via the application of the Tool 11. Per the tool, two steps should be followed for the update briefing.

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

The current baseline's validity is assessed using the following sub-steps.

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

According to AMS-I.D, the project's baseline is defined as "the installation of a Greenfield power plant." As the project activity includes utilizing hydro power to produce and sell electricity, or simply put electricity generation from renewable sources, it complies with all relevant mandatory national and/or sectoral policies applicable at the time of the project activity requesting renewal of the crediting period.

Step 1.2: Assess the impact of circumstances

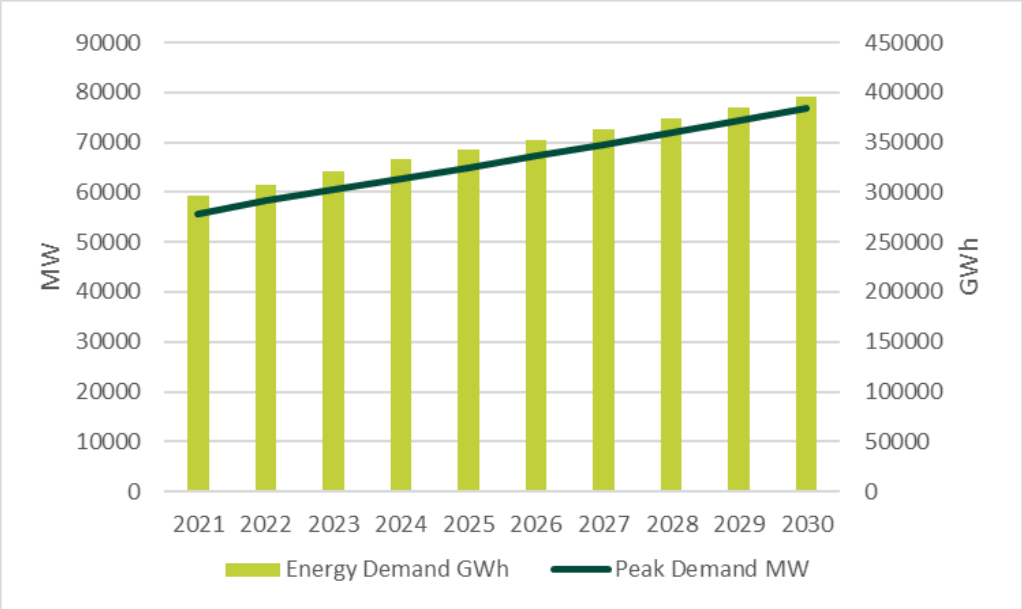
New circumstances in Turkey impact the grid's emission factor and, thus, on the project activity's current baseline emissions. Accordingly, the emission factors for the second crediting period have been updated in line with the latest version of the "Turkey's National Electric Grid Emission Factor" for 2019, which is the latest available data published by official sources. There has been no major deviation or change in the market characteristics during the first crediting 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.

Turkey is an energy importing country and the electricity is mostly generated by fossil fuels, which also has the largest share in energy expenses. As a developing country with a fast-growing population, Turkey attaches a great deal of importance to its energy diversification and security to reduce energy dependence on fossil sources.

According to Turkish Electricity Transmission Corporation (TEİAŞ) projections, the demand for energy in the country will reach 395.9 GWh by 2030.[16] In 2011, the total electricity consumption was at 230.3 GWh whereas in 2020, this figure reached 306.1 GWh – indicating at a 32 percent hike in a decade.[17] The figure below demonstrates the demand projections, with a realistic average of 3.3 percent increase per year.

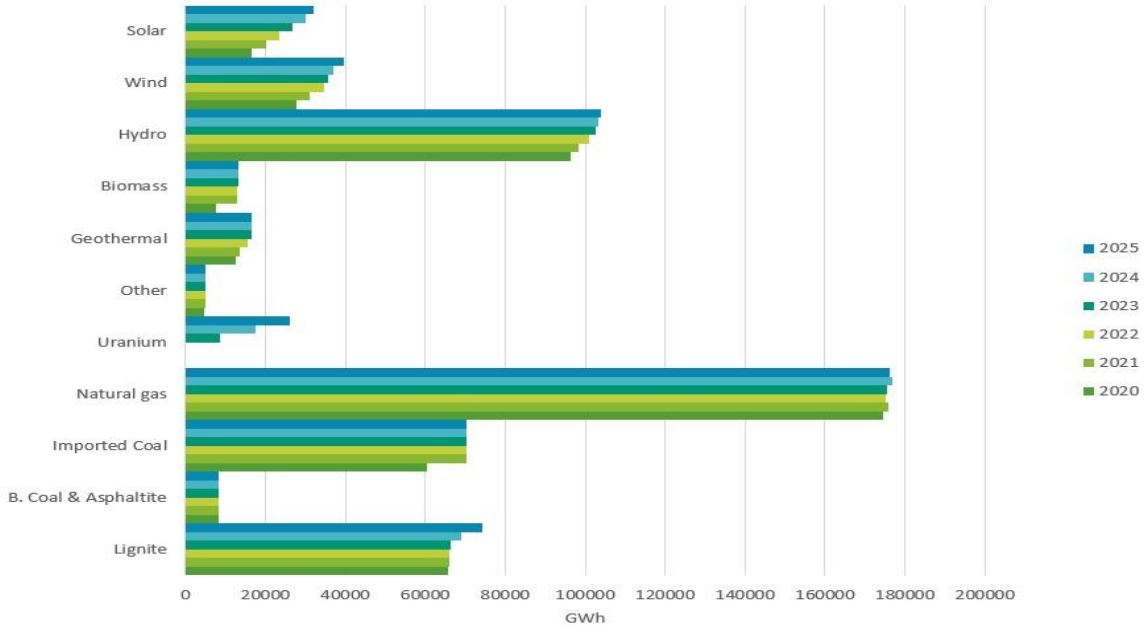
Figure 6. Energy demand projection, Turkey 2021-2030



As seen in the figure below, coal and natural gas has been and continue to be dominant in Turkey's energy supply mix. In 2020, Turkey supplied 106.2 GWh of electricity to its grid from coal, 69.3 GWh from natural gas, 78.1 GWh from hydro, 24.7 GWh from wind, 11.2 GWh from solar PV and 9.9 GWh from geothermal sources.[18]

[16] TEİAŞ Generation Capacity Projection for 2021-2025, Section 2.4 [TEİAŞ GCP]
[17] TEİAŞ GCP, Section 2.3
[18] International Energy Agency, Turkey Data browser, Electric generation by source 1990-2020 data:text/csv;header=present;charset=utf-8,Source:%20IEA%20Electricity%20Information%20https://www.iea.org/data-and-statistics/data-product/electricity-information%0D%0ADocumentation:%20https://iea.blob.core.windows.net/assets/910f28b7-5276-4599-a349-097ab58aeea8/Ele_documentation.pdf%0D%0AThis%20data%20is%20subject%20to%20the%20IEA's%20terms%20and%20conditions:%20https://www.iea.org/terms%0D%0A%0A,Coal,Oil,Natural%20gas,Hydro,Geothermal,Biofuels,Wind,Waste,Other%20sources,Solar%20PV,Units%0D%0A1990,20181,3942,10192,23148,80,,,,,,GWh%0D%0A1995,28047,5772,16579,35541,86,222,,,,,GWh%0D%0A2000,38187,9311,46216,30879,76,166,33,8,46,,GWh%0D%0A2005,43192,5483,73445,39561,94,34,59,10,78,,GWh%0D%0A2010,55047,2180,98144,51796,668,332,2916,14,111,,GWh%0D%0A2015,76166,2224,99218,67146,3425,1241,11652,22,495,194,GWh%0D%0A2020,106269,323,69331,78119,9929,4390,24703,30,1072,11265,GWh

Figure 7. Electricity supply projection by source, Turkey 2020-2025



Thus, for the analysis of the baseline scenario it can be concluded that:

- Energy demand in Turkey has been increasing and will continue to, for the foreseeable future.
- There is a crucial need for electricity generation investments to satisfy the demand which indicated that the proposed project activity's energy generation would otherwise be generated by other power plants.
- Fossil fuels will continue to dominate the generation mix while hydro-included renewable sources will remain low and non-hydro energy contribution will stay negligible. This also demonstrates that the most of new capacity additions will consist of fossil-fuel fired power plants.

All of the aforementioned factors indicate that if Aralık HEPP does not generate renewable energy, the power from a new grid-connected thermal plant would be the most likely scenario – which would increase the amount of GHGs released to the atmosphere.

Step 1.4: Assessment of the validity of the data and parameters

Emission reduction calculations are based on two main parameters; energy generation and grid emission factor. The grid emission factor will be updated. As a methodology

requirement, the grid emission factor has been updated during the renewal of the crediting period.

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

Step 2.1: Update the current baseline

As mentioned in Step 1 of this section, AMS-I.D prescribes the baseline scenario for projects being "the installation of a Greenfield power plant " as follows:

"The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid."[19]

Thus, there has been no deviation in the baseline scenario.

Step 2.2.: Update the data and parameters

The grid emission factor has been updated in compliance with the Energy and Natural Resources Ministry's publication, which includes emission factor values calculated for the year 2019.

B.5. Demonstration of additionality

This section has been assessed and validated in the first crediting period.

B.5.1 Prior Consideration

N/A. Only (non-CER) retroactive projects and all projects undergoing Design Changes to include new technologies/measures are required to demonstrate Prior consideration by submission timelines.

B.5.2 Ongoing Financial Need

The motivation to participate in the voluntary carbon market stems from the investor's ability to earn revenue from the sale of carbon credits, which become a source of income

[19] AMS-I.D, v.18 Section 5.2.1.

for financially struggling investments. Before Aralık HEPP was implemented a decade ago, the project owner considered carbon revenue for the establishment of the plant. Necessary preparations were done, and the project was validated under the Gold Standard. The high transaction costs of issuing and retiring the credits were deemed as a barrier to participation due to the low prices of carbon credits in an inactive market. It was then assessed that the revenue that would be gained by the sale of carbon credits would not cover the costs of issuance. When the project owner started to consider carbon revenue for the project and started construction in 2008, carbon credits for renewable energy plants were traded from $7-8/ tCO_2e[20]. When the project concluded its Pre-Feasibility Assessment (PFA) for Gold Standard, GS VERs were around $11.1/ tCO_2e.[21] However, the carbon credit market experienced a collapse in 2012 with prices falling to €0.5 tCO_2e, causing a "panic" with project developers.[22] The decline continued yet the project issued credits until 2013 despite the market crash, hoping that prices will increase. Unfortunately, the decline in prices continued until 2021 and it has become a financial burden for the project activity to pat the expenses of the consultancy, Standard fees and VVB costs. Even considering 1 €/tCO_2e pricing without any issuance or retirement costs, the project activity could not benefit from carbon revenue. However, after 2021 the average price per credit increased by 72.5%.[23] This increase has become a hope for the project owner to pursue carbon revenue again, more crucial than ever at this period where operation costs increased quite a bit.

Milestone	Date
License Issuance	16/05/2006
Board Decision for Consideration of Carbon Revenue	20/10/2006
Feasibility Study Report	November 2006
EIA Approval Letter	08/12/2006
Equipment Purchase Agreement (Investment Decision)	27/07/2007
Start of Construction	21/03/2008
Loan Agreement	10/04/2008
Preliminary Stakeholder consultation Meeting	14/03/2009
Completion of PFA by GS	10/03/2010

[20] https://www.forest-trends.org/wp-content/uploads/2017/06/2008_StateofVoluntaryCarbonMarket2.pdf Page 8
[21] https://www.forest-trends.org/wp-content/uploads/imported/final_report_2010_9-1-10_no-crop-pdf.pdf Page 71
[22] https://cepr.org/voxeu/columns/collapse-clean-development-mechanism-scheme-under-kyoto-protocol-and-its-spillover
[23] https://www.senken.io/academy/pricing-of-carbon-credits

Commissioning Date	30/04/2010
SFR Meeting	06/05/2010
Continued Operation Start Date	30/04/2010
Start of First CP	01/05/2010
End of First CP	30/04/2017
Start of First MP (within First CP)	01/05/2010
End of First MP (within First CP)	30/09/2013
Start of Second CP	01/05/2017
Delayed Start of Second CP	03/11/2022
End of Second CP	30/04/2024

The project activity is currently not benefiting from the feed-in-tariff and has been selling electricity below the market price. As the carbon markets have become more active and higher in volume, future verifications are expected to provide a source of income for the operation and continuation of the plant. Thus, the project activity is still in need of carbon revenue. The carbon revenue derived will be used to compensate for the loan payments the project is paying and will help ease the burden of high operation and maintenance costs.

B.6. Sustainable Development Goals (SDG) outcomes

Relevant Target/Indicator for each of the three SDGs

Table 5. SDG Targets and Impacts

Sustainable Development Goals Targeted	Most relevant SDG Target	SDG Impact Indicator (Proposed or SDG Indicator)
13 Climate Action	13.2 Integrate climate change measures into national policies, strategies and planning	Emission Reductions 13.2.2 Total greenhouse gas emissions per year
8 Decent Work and Economic Growth	8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment	Number of people employed 8.8.2 Level of national compliance with labour rights (freedom of association and collective bargaining) based on International Labour Organization (ILO) textual

		sources and national legislation, by sex and migrant status
7 Affordable and Clean Energy	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	MWh of renewable energy generated 7.2.1 Renewable energy share in the total final energy consumption

B.6.1 Explanation of methodological choices/approaches for estimating the SDG Impact

SDG 13 Climate Action

The project contributes to climate change mitigation by displacing fossil fuels while meeting the host country's growing energy demand. The impact is measured via the calculation of ER_y emission reductions per year, in line with the applied methodology.

$$ER_y = BE_y - PE_y - LE_y$$ [24]

where,

ER_y = Emission reductions in year *y* (t CO_2)

BE_y = Baseline emissions in year *y* (t CO_2)

PE_y = Project emissions in year *y* (t CO_2)

LE_y = Leakage emissions in year *y* (t CO_2)

and,

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$ [25]

where,

BE_y = Baseline emissions in year *y* (t CO_2)

[24] AMS-I.D v.18, Section 5.8
[25] AMS-I.D v.18, Section 5.5

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

$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of Tool 7 (t CO_2/MWh)

SDG 8 Decent Work and Economic Growth

The project activity directly contributes to the achievement of the SDG target because it promotes the increase of employment opportunities for the local community and crease short and long-term employment to dozens of workers, while providing a safe working environment. The project also provides health and safety trainings to all employees, contributing to the corresponding SDG Target 8.8. and its indicator 8.8.2.

Number of people employed due to the project activity can be measured via official employment records of the state. The number of trainings provided can be measured via the records kept at the plant such as training participation lists, tests taken after the trainings and certificates.

SDG 7 Affordable and Clean Energy

The project increases the renewable energy share in Turkey's energy production mix. The hydro power plant directly contributes to the SDG target, because the project activity delivers renewable energy which would otherwise be provided by fossil-fuel dominated grid-connected power plants.

Calculation of Electricity Generation of Aralık HEPP is as follows:

$$Electricity\ Generation\ of\ Aralık\ HEPP = Electricity\ supplied\ to\ the\ grid\ (MWh) - Electricity\ consumption\ from\ the\ grid\ (MWh)$$

B.6.2 Data and parameters fixed ex ante

SDG13

Data/parameter	**$EF_{grid,CM,y}$**
Unit	t CO_2/MWh
Description	Turkey'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	Turkey's National Electric Grid Emission Factor https://bit.ly/3HDhL1j
Value(s) applied	0,4929 t CO_2/MWh
Choice of data or Measurement methods and procedures	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: $EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$[26] 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, $OM = 0.7258 \quad BM = 0.4153$ $w_{OM} = 0.25 \quad w_{BM} = 0.75$ Thus, $EF_{grid,CM,y} = 0.7258 \times 0.25 + 0.4153 \times 0.75$ $EF_{grid,CM,y} = 0.4929 \ t\,CO_2/MWh$
Purpose of data	The data is utilized to calculate baseline emissions, which demonstrates the proposed project activity's contribution to SDG Target 13.2.
Additional comment	This parameter is fixed ex-ante for the second crediting period.

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

B.6.3 Ex ante estimation of SDG Impact

SDG 7

The project activity directly contributes to the targeted SDG by achieving annually 45.15 GWh of clean energy generation and displacing emission intensive energy in the national grid. The project activity involves the installation of a hydropower plant with 12.41 MWe of total installed capacity.

SDG 8

The project activity creates long-term employment for 15 people, out of 14 are from the local community. The employees also undergo health and safety trainings, and if need be, may be provided with other trainings for skill improvement.

SDG 13

The proposed project uses Turkey's Energy and Natural Resources Ministry's factsheet for the emission factors to measure estimated emission reductions. The publication demonstrates "Turkey's National Electricity Grid Emission Factor" for 2019 and includes Operating Margin (OM), Build Margin (BM), and Combined Margin (CM) emission factor values. To calculate these figures, the ministry bases the factsheet off of Clean Development Mechanism's "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:

- Turkey's electricity generation, consumption, and loss statistics from TEİAŞ,
- Common Reporting Format (CRF) prepared in the scope of Turkey'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 2019 from the ministry's factsheet are provided below.

$OM = 0.7258$

$BM = 0.4153$

$CM = 0.5706$

Nevertheless, the CM value the ministry provided is only valid for the first crediting period. According to Tool 7's 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 0.25 and w_{BM} as 0.75.[27]

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.

Calculation of Operating Margin Emission Factor

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

$$EF_{grid,OMsimple,y} = 0.7258\ t\ CO_2/MWh$$

Calculation of Build Margin Emission Factor

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:

$$EF_{grid,BM,y} = 0.4153\ t\ CO_2\ /MWh$$

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

Calculation of Combined Margin Emission Factor

According to Tool 7's stipulations, the combined margin emission factor should be calculated as:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$[28]

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,

$$w_{OM} = 0.25 \quad \text{and} \quad w_{BM} = 0.75$$

Thus,

$$EF_{grid,CM,y} = 0.7258 \times 0.25 + 0.4153 \times 0.75$$

$$EF_{grid,CM,y} = 0.4929 \ t\,CO_2/MWh$$

Baseline Emissions

Per AMS-I.D, baseline emissions "include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity." Thus, the baseline emissions are calculated as follows:

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

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 project activity in year y (MWh/yr)

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

$EF_{grid,CM,y}$ = Combined margin CO_2 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 CO_2/MWh)

The project activity includes the installation of a new grid-connected renewable power plant, so:

$$EG_{PJ,y} = EG_{PJ,facility,y}$$ [29]

where,

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

Project Emissions

As stipulated in AMS-I.D, project emissions from water reservoirs of hydropower plants shall be considered apropos "ACM0002: Grid-connected electricity generation from renewable sources."[30] Nevertheless, the project activity does not lead to the formation of a new reservoir. The weir is at the same level with the riverbed. Excess water will spillover the weir therefore the area will be limited to the existing riverbed.

$$PE_y = 0$$

Leakage

Leakage emissions are considered when energy generating equipment is transferred from another activity. None of the generation equipment utilized in Aralık HEPP was transferred from another activity. Thus, leakage is not considered for the project activity.

$$LE_y = 0$$

Net Emission Reductions

According to AMS-I.D, emission reductions are calculated as:

$$ER_y = BE_y - PE_y - LE_y$$ [31]

[29] AMS-I.D v.18, Section 5.5.1.1
[30] ACM0002: Grid-connected electricity generation from renewable sources, Version 20 [ACM0002 v.20] https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO
[31] AMS-I.D v.18, Section 5.8

where,

ER_y = Emission reductions in year *y* (t CO_2)

BE_y = Baseline emissions in year *y* (t CO_2)

PE_y = Project emissions in year *y* (t CO_2)

LE_y = Leakage emissions in year *y* (t CO_2)

In the case of the project activity, $ER_y = BE_y$.

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

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

Based on the information and calculations provided in this section, the emission reductions created from the operation of Aralık HEPP can be calculated as follows,

$$ER_y = 45{,}150\ MWh \times 0.4929\ t\ CO_2/MWh$$
$$= 22{,}254\ t\ CO_2\ e$$

B.6.4 Summary of ex ante estimates of each SDG Impact

SDG 7

Year	Baseline estimate	Project estimate	Net benefit
01/05/2017 - 31/12/2017	0	30,223	30,223
2018	0	45,150	45,150
2019	0	45,150	45,150
2020	0	45,150	45,150
2021	0	45,150	45,150
2022	0	45,150	45,150
2023	0	45,150	45,150
01/01/2024 - 30/04/2024	0	14,927	14,927
Total	**0**	**316,050**	**316,050**
Total number of crediting years		**7**	

Annual average over the crediting period	**0**	**45,150**	**45,150**

SDG 13

Year	Baseline estimate	Project estimate	Net benefit
01/05/2017 - 31/12/2017	14,897	0	14,897
2018	22,254	0	22,254
2019	22,254	0	22,254
2020	22,254	0	22,254
2021	22,254	0	22,254
2022	22,254	0	22,254
2023	22,254	0	22,254
01/01/2024 - 30/04/2024	7,357	0	7,357
Total	**155,778**	**0**	**155,778**
Total number of crediting years	**7**		
Annual average over the crediting period	**22,254**	**0**	**22,254**

SDG 8

The project activity creates long-term employment for 15 people, out of 14 are from the local community. The employees also undergo health and safety trainings, and if need be, may be provided with other trainings for skill improvement.

B.7. Monitoring plan

B.7.1 Data and parameters to be monitored

SDG 7

Data/parameter	**$EG_{PJ,y}$**
Unit	MWh

Description	Quantity of net electricity generation supplied to the grid by power plant/unit in year y
Source of data	Electricity meter readings on-site
Value(s) applied	45,150 MWh
Measurement methods and procedures	The net electricity is measured continuously by a power meter at the grid interface and recorded monthly. EPİAŞ records (main data) are the source of the exact electricity generation of the project and the imports from the grid. The quantity of net electricity delivered to the grid is cross checked with the invoices (cross-check data). The quantity of electricity supplied by the project plant/unit to the grid and the quantity of electricity delivered to the project plant/unit from the grid are measured. Net generation is calculated via subtracting energy delivered by the project activity to the grid for internal consumption from electricity fed to the grid.
Monitoring frequency	Continuous, hourly measurements, with daily and monthly recordings, were applied. The plant manager and the staff retrieved the records regularly, every day. The monthly records documented by TEİAŞ and the plant manager were used for monitoring emission reductions.
QA/QC procedures	According to the Article 2 of the Communiqué of Meters in Electricity Sector[32]: '*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 is responsible from control and calibration of the meters. Also, according to Article 11 of this Communiqué, meters shall be in class of 0.5s, which means error interval for measuring is in +-0.5% range which is well acceptable according to rules. Paragraph b) of the Article 9 of the "Regulation of Metering and Testing of Metering Systems"[33] (Regulation) of

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

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

	Ministry states that: *"b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done* ***every 10 years****."* Therefore, periodic calibration of the meters will be done every 10 years according to the regulation. However, meters on the plant can also be calibrated by TEİAŞ within the 10-year period. Furthermore, Article 67 of the same regulation stipulated that, the calibration shall be done in calibration stations which have been tested and approved by Ministry of Trade and Industry. Article 10 d) of Communiqué requires the meters shall be three phase four wire and Article 64 of Regulation clearly states how calibration shall be performed for this kind of meters. As mentioned, the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan.
Purpose of data	Calculation of baseline emissions and emission reductions
Additional comment	N/A

SDG 13

Data/parameter	**ER_y**
Unit	t CO_2e/yr
Description	Emission reductions in year y
Source of data	AMS-I.D v.18
Value(s) applied	22,254 t CO_2e/yr (estimated)
Measurement methods and procedures	Baseline emissions include only CO2 emissions from electricity generation in power plants that are displaced due to the project activity. 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. $$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Monitoring frequency	Each monitoring period
QA/QC procedures	N/A
Purpose of data	Monitor the project activity's contribution to SDG 13
Additional comment	N/A

SDG 8

Data/parameter	**Quantity of Employment**
Unit	Number of employees
Description	Long term employment created directly due to the project activity
Source of data	Official employment records from the Host Country
Value(s) applied	15 Employees
Measurement methods and procedures	According to the Host Country's Labor Law[34], employers are obliged to insure their employees for the duration of their employment. Employers' insurance records are proof that there are income generation by the employer which is project owner.
Monitoring frequency	Each monitoring period
QA/QC procedures	Site personnel will be interviewed on job opportunities. Records of People employed (Social Security Records) by the project will be maintained.
Purpose of data	Assessing the impact of the project activity on SDG 8
Additional comment	N/A
Measurement methods and procedures	According to the Host Country's Labor Law[35], employers are obliged to insure their employees for the duration of their employment. Employers' insurance records are proof that there are income generation by the employer which is project owner.

[34] https://www.mevzuat.gov.tr/MevzuatMetin/1.5.4857.pdf

[35] https://www.mevzuat.gov.tr/MevzuatMetin/1.5.4857.pdf

Data/parameter	**Quality of Employment**
Unit	Number of trainings provided
Description	Number of trainings provided to the employees in year y
Source of data	Trainings records of employees
Value(s) applied	At least one training per annum
Measurement methods and procedures	According to the occupational health and safety law[36] , the employer is obliged to provide this training to its employees. Training records and participant lists can also be considered as proof.
Monitoring frequency	Each monitoring period
QA/QC procedures	Participant lists and records for HSE trainings will be used as proof of the attended trainings.
Purpose of data	Assessing the impact of the project activity on SDG 8
Additional comment	N/A

Water Quality and Quantity

Data/parameter	**Flow rate of water released**
Unit	m^3/s
Description	Release of minimum flow to protect aquatic life
Source of data	Flow rate of water released from the weir
Value(s) applied	Required quantity of average natural flow will be released
Measurement methods and procedures	Minimum flow is constantly provided to the river. The amount of water released is constantly calculated via the measuring device, which is installed by a verified hydrometry company. Company officials also travel to the

[36] https://www.mevzuat.gov.tr/MevzuatMetin/1.5.6331.pdf

	site in every three months and do measurements manually, which also acts as a litmus test for the accuracy of the devices. All data is published and validated in annual reports by the verifier company.
Monitoring frequency	Continuous measurement
QA/QC procedures	Flow measurements from the weir
Purpose of data	Assessing the impact of the project activity on Principle 8.1
Additional comment	N/A

Aquatic Life

Data/parameter	**Effectiveness of the fish passage**
Unit	-
Description	Assess the risk of fish passage's non-functionality
Source of data	Photos of the fish passage
Value(s) applied	At least one photo for each monitoring year
Measurement methods and procedures	Fish passage is integrated in weir design and minimum flow is continuously being released. Accordingly, fish passage has been designed to enable fish migration in the project. The effectiveness of the fish passage will be validated with photos taken of the passage for each monitoring year.
Monitoring frequency	Each monitoring year in the respective monitoring period
QA/QC procedures	The project activity includes integrating fish passage in weir design and releasing minimum flow continuously in order to provide free river flow for fish passage.
Purpose of data	Assessing the impact of the project activity on GS4GG Principle 9.11
Additional comment	N/A

B.7.2 Sampling plan

The data and parameters monitored in *Section B.7.1* are not determined by a sampling approach. Hence, sampling is not required for the project activity.

B.7.3 Other elements of 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 net electricity generation that is to be monitored is subject to the accounting quality systems of EPİAŞ and 'Reşadiye Hamzalı Elektrik Üretim A.Ş.' The net electricity is measured continuously by a power meter at the grid interface and recorded monthly. EPİAŞ records (main data) are the source of the exact electricity generation of the project and the imports from the grid. The quantity of net electricity delivered to the grid is cross checked with the invoices (cross-check data). The quantity of electricity supplied by the project plant/unit to the grid and the quantity of electricity delivered to the project plant/unit from the grid are measured. Net generation is calculated via subtracting energy delivered by the project activity to the grid for internal consumption from electricity fed to the grid.

Table 6. Technical details for on-site meters

Function	Brand	Model	Serial No.	Accuracy Class	Calibration Status	Calibration Date
Main Meter	Landis	Landis + Gyr E550	56753528	0.5S	Calibrated	18/10/2021
Back-up Meter	ELSTER	A1500	376498	0.5S	Calibrated	01/05/2010

The main meter was changed on 18/10/2021. The details for the former meters are provided in the table below. According to the relevant regulation, the calibration frequency is 10 years. In every ten years, the meters need to be replaced and calibrated. The replacement and calibration are done by TEİAŞ only and do not depend on the project owner. The next calibration is expected to take place until 2031. The former main meter was installed on 01/05/2010.

Table 7. Technical details for former main meter

Function	Brand	Model	Serial No.	Accuracy Class
Main Meter	ELSTER	A1500	376500	0.5S

Power Plant Manager, will be responsible for the electricity generated, gathering all relevant data and keeping the records. He will be informed about VER concepts and mechanisms and how to monitor and collect the data which will be used for emission reduction calculations.

Generation data collected during crediting period will be submitted to 'Life İklim ve Enerji Ltd. Şti.' who will be responsible for calculating the emission reduction subject to verification. Generation data will be used to prepare monitoring reports which will be used to determine the vintage from the project activity. These reports will be submitted to the duly authorized and appointed Designated Operational Entity (DOE) before each verification period. 'Reşadiye Hamzalı Elektrik Üretim A.Ş.' will keep all the data needed for the calculation of emission reductions during the crediting period and until two years after the last issuance of GS VERs for Aralık HEPP. The members of the VER Team are expected to include:

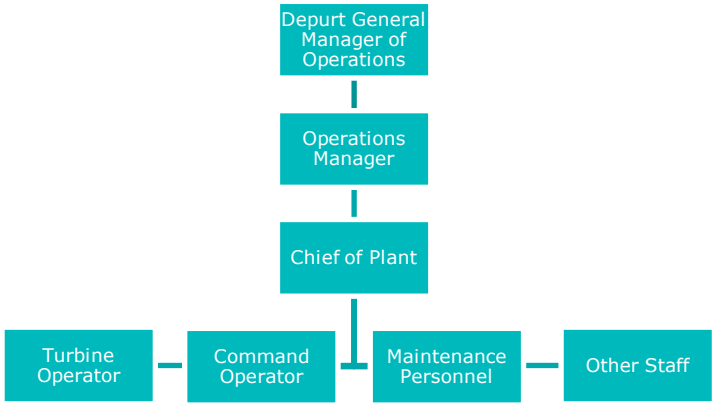
Plant Manager: Overall responsibility of compliance with VER monitoring plan

Accounting Manager: Responsible for keeping data about power sales, invoicing and purchasing.

Control Operators & Electrical Maintenance: Staff will be responsible for day-to-day operation and maintenance of the plant and equipment. All staff will be trained and have certificated for working with high voltage equipment.

Like İklim ve Enerji: Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.
The details for the monitoring team are provided in the figure below.

Figure 8. Operational structure of the monitoring team



SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1 Start date of project

According to GS4GG Principle 4, the start date of the project is 27/07/2007, the date of purchase agreement for the equipment. The project became operational as of 30/04/2010.

C.1.2 Expected operational lifetime of project

According to the information provided at validation, the operational lifetime of the project has been determined as 45 years after construction. As the project was commissioned in 2010, it can be concluded that 12 years of the initially set 45-year timespan has passed. Thus, the project is expected to have at least 33 years of technical life.

C.2. Crediting period of project

C.2.1 Start date of crediting period

The first crediting period started on 01/05/2010 and ended on 30/04/2017. The second crediting period started on 01/05/2017 and will end on 30/04/2024.[37]

[37] The start date of the issuance of credits will be the date the project documents will be submitted to SustainCert, per GS4GG rules.

C.2.2 Total length of crediting period

The project uses two times renewable crediting period. Each crediting period consists of 7 years.

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE ASSESSMENT

D.1 Safeguarding Principles that will be monitored

A completed Safeguarding Principles Assessment is in Appendix 1, ongoing monitoring is summarized below. s

Principles	Mitigation Measures added to the Monitoring Plan
Principle 6.1	Refer to B.7.1 Quality of employment
Principle 6.1	Refer to B.7.1 Quantitative employment
Principle 8.1	Refer to B.7.1 Flow rate of water released
Principle 9.11	Refer to B.7.1 Effectiveness of fish passage

D.2. Assessment that project complies with GS4GG Gender Sensitive requirements

Question 1 - Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?	As per Gold Standard Gender Policy, para 4.2 (i) "Foundational gender-sensitive requirement – This strengthens Gold Standard's 'do no harm' approach and addresses safeguards to prevent or mitigate adverse impacts on women or men and girls and boys. Such action is mandatory for all projects seeking Gold Standard certification and includes compliance with the gender 'do no harm' safeguards, gender gap analysis and gender sensitive stakeholder consultations." The project being a renewable energy project is not gender sensitive project. The project does not adversely impact women or men.

Question 2 - Explain how the project aligns with existing country policies, strategies and best practices	The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis. Turkey is party to Convention on Discrimination[38] since 1972 to prevent any form of discrimination.
Question 3 - Is an Expert required for the Gender Safeguarding Principles & Requirements?	An Expert is not required. The project is a renewable energy project, and it does not discriminate among genders.
Question 4 - Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	An Expert is not required. The project is a renewable energy project, and it does not discriminate among genders.

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

The below is a summary of the 2 step GS4GG Consultation for monitoring purposes. Please refer to the separate Stakeholder Consultation Report for a complete report on the initial consultation and stakeholder feedback round.

E.1 Summary of stakeholder mitigation measures

The grievance mechanism as suggested by the Gold Standard is fully functional. A related form is available at the village head's office and the local coffee shop at all times. There is no stakeholder grievance/compliant from the local stakeholders in the beginning of the second crediting period. The comments received during the first crediting period was taken into account and responded accordingly as explained in the initial Project Description Document. The preliminary stakeholder consultation meeting was held on 14/03/2009 and the SFR meeting was held on 06/05/2010. The village head has the plant chief's contact information. This ensures the continuous contact between the project owner and local community. The project owner regularly checks with the village head and in case of any complaint, request and need, the locals can

[38] https://www.mfa.gov.tr/convention-on-the-elimination-of-all-forms-of-discrimination-against-women.en.mfa

directly get in touch with the project owner. The logbook and forms that can be filled by local stakeholders for any grievance is kept at the village head's office.

Furthermore, an announcement was published on the website of the project representative on 08/04/2022[39] and further comments from local and global stakeholders were encouraged. On the same day, a logbook was also left at the village head's office and declaration from the village head was obtained that no negative feedback has been received regarding the project since the start of its GS processes. After the 2-month long stakeholder consultation round, no comments were received from the stakeholder regarding to the documents or other related influence of the project activity. Another declaration was taken from the village head on 04/07/2022 to ensure that no comments were received from local stakeholders within those three months. No legal disputes exist about the project's implementation.

E.2 Final continuous input / grievance mechanism

Method	Include all details of Chosen Method (s) so that they may be understood and, where relevant, used by readers.
Continuous Input / Grievance Expression Process Book (mandatory)	The grievance mechanism as suggested by the Gold Standard is fully functional. The related forms are available at the village head's office and at the local coffee shop at all times.
GS Contact (mandatory)	help@goldstandard.org

[39] https://life-climate.com/projeler/aralik-hidroelektrik-enerji-santrali-1

APPENDIX 1 - SAFEGUARDING PRINCIPLES ASSESSMENT

Complete the Assessment below and copy all Mitigation Measures for each Principle into SECTION D above. Please refer to the instructions in the Guide to Completing this Form.

Assessment Questions/ Requirements	Justification of Relevance (Yes/potentially/no)	How Project will achieve Requirements through design, management or risk mitigation.	Mitigation Measures added to the Monitoring Plan (if required)
Principle 1. Human Rights			
1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights	No	The project does not involve any conflict with livelihood of local people and respect all human rights. Turkey, the host country, prohibits discrimination on the basis of a person's race, sex, religion, place of birth, or social status. The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation, or any other basis. **1&2-**Turkey ratified the Universal Declaration of Human Rights[40] and the	N/A

[40] https://www.un.org/en/about-us/universal-declaration-of-human-rights

2. The Project shall not discriminate with regards to participation and inclusion		European Convention on Human Rights[41] in 1949 and 1954, respectively. Respecting human rights and prohibiting any type of discrimination are also binding by the Turkish Constitution.[42]	
Principle 2. Gender Equality			
1. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women 2. Projects shall apply the principles of nondiscrimination, equal treatment, and equal pay for equal work	No	Turkey has ratified ILO conventions, which provides gender equality. It also shows parallelism with national strategies prepared for women employment by creating opportunities for all. The project owner respects Article 5/8425 of Labour Law[43], which states no discrimination based on gender, race, religion, sexual orientation or any other basis is allowed. 1. The project's aim is to generate clean electricity from hydro power and to replace fossil fuel power. The project abides the rules of equality accordingly and does not involve and	N/A

[41] https://www.echr.coe.int/documents/convention_eng.pdf
[42] https://global.tbmm.gov.tr/docs/constitution_en.pdf
[43] https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/64083/77276/%20F75317864/TUR64083%20English.pdf

3. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks 4. (where required) Summary of opinions and recommendations of an Expert Stakeholder(s)		is not complicit in any form of discrimination. 2. Qualified local residents, both men and women, are recruited to work for the project. During stakeholders' consultation process, comments were collected from the local people, including both men and women. Employees' salaries are not determined based on their genders or gender identities, but rather the position they are working in. (engineer, janitor etc.) 3. The project follows and respects the rules of equality. 4. An Expert is not required.	
Principle 3. Community Health, Safety and Working Conditions			
1. The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community	No	The project produces electricity from renewable sources and by nature of its technology, it does not have exposure to increased health risks and shall not adversely affect the health of the workers and the community. All the safety and hygiene measures are being ensured in order maintain a safe and healthy environment for the workers at site. The employees receive trainings and learn how	N/A

		to act in case of emergencies. Thus, necessary health and safety measures are being taken by both the project owner and the employees, who receive the trainings provided. The project is also in compliance with all national laws and regulations.	
Principle 4.1 Sites of Cultural and Historical Heritage			
Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture?	No	The project site does not include sites, structures, or objects with historical, cultural, artistic, traditional, or religious values or intangible forms of culture.[44]	N/A
Principle 4.2 Forced Eviction and Displacement			
Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	No	The project does not require voluntary or involuntary relocation of people. (temporary or permanent, full, or partial)	N/A
Principle 4.3 Land Tenure and Other Rights			

[44] Environmental Impact Assessment (EIA) Report, Section IV.2.9, p. 59

a. Does the Project require any change, or have any uncertainties related to land tenure arrangements and/or access rights, usage rights or land ownership? b. For Projects involving land use tenure, are there any uncertainties with regards to land tenure, access rights, usage rights or land ownership?	No	No resettlement or relocation required for the project's construction or operation. All land acquisition was carried out in compliance with the Expropriation Law[45].	N/A
Principle 4.4 - Indigenous people			
Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?	No	No indigenous peoples are present in or within the area of influence of the proposed project activity or the project site.	N/A
Principle 5. Corruption			

[45] https://www.mevzuat.gov.tr/mevzuatmetin/1.5.2942.pdf

1. The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects	No	The project does not condone or support corruption. Turkey has ratified various international conventions on bribery and corruption.[46] It is also prohibited in relevant Turkish laws and regulations.[47]	N/A
Principle 6.1 Labour Rights			
1. The Project Developer shall ensure that all employment is in compliance with national labour occupational health and safety laws and with the principles and standards embodied in the ILO fundamental conventions	No	1. The Project complies with national labour and occupational health and safety laws, obligations under international law, and the principles and standards embodied in ILO's fundamental conventions. Labour rights and health and safety proceedings are also protected in the national Labour Law and Occupational Health and Safety Law[48]. The project fully respects the employees' rights in accordance with all labour related laws endorsed	N/A

[46] https://masak.hmb.gov.tr/uluslararasi-mucadele
[47] https://masak.hmb.gov.tr/ulusal-mucadele
[48] https://www.lawsturkey.com/law/occupational-health-and-safety-law

2. Workers shall be able to establish and join labour organisations 3. Working agreements with all individual workers shall be documented and implemented and include: a) Working hours (must not exceed 48 hours per week on a regular basis), AND b) Duties and tasks, AND c) Remuneration (must include provision for payment of overtime), AND d) Modalities on health insurance, AND		within Turkey, including the law on social and health insurance[49]. 2. The rights to unionize and bargain collectively are highly protected by Labor Law. The project fully respects the employees' rights in accordance with all labour related laws endorsed within Turkey. Law compliance is subject to government's inspection and ruling. 3. Working agreements between the company and individual workers are documented and implemented, including working hours, duties and tasks, remuneration, modalities on health insurance, modalities on termination of contract, provision for annual leave, etc. The employment model applied is locally and culturally appropriate. 4. Child labour, as defined by the ILO Minimum Age Convention is not allowed and prohibited in relevant	

[49] https://www.lawsturkey.com/law/social-insurance-and-universal-health-insurance-law-5510

e) Modalities on termination of the contract with provision for voluntary resignation by employee, AND f) Provision for annual leave of not less than 10 days per year, not including sick and casual leave. 4. No child labour is allowed (Exceptions for children working on their families' property requires an Expert Stakeholder opinion) 5. The Project Developer shall ensure the use of appropriate		laws and regulations in Turkey and international conventions Turkey is a signatory to.[50] The project owner ensures the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures. All equipment in the project is operated properly according to the work procedures and safety regulation rules.	

[50] https://www.ilo.org/ipec/lang--en/index.htm

equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures			
Principle 6.2 Negative Economic Consequences			
1. Does the project cause negative economic consequences during and after project implementation?	No	The project does not cause any negative consequences after implementation. If anything, the project activity has positive socioeconomic impacts as it creates job opportunities for the local people, that did not exist before the project's implementation.	N/A
Principle 7.1 Emissions			
Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No	As a renewable energy power plant, the project contributes to "Emissions Reductions or Removals and/or Adaptation to Climate Change" by reducing CO_2 emissions caused by fossil fuel-fired power plants that are displaced due to the project activity, in line with GS4GG principles with the mitigation of an expected amount of 22,254 tonnes of CO_2e.	N/A

Principle 7.2 Energy Supply			
Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No	The project's does not use energy from a local grid or power supply or fuel resource that provides for other local users. It is connected to the national grid and supply 45 GWh additional energy to the grid. The plant's consumption will be read from monthly records taken from the meters.	N/A
Principle 8.1 Impact on Natural Water Patterns/Flows			
Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	No	The project owner guarantees to comply with the "minimum water rule." Since the project activity is a run-off-river type HEPP, it does not cause any pollution or change in water quality in terms of chemical, biological oxygen demand or any other pollutants.	Flow will be monitored continuously by project owner. For cross check, data will be compared by DSI flow records. Minimum flow will be released to protect aquatic life. There will be an expert assessment on adequacy of flow released.
Principle 8.2 Erosion and/or Water Body Instability			
a. Could the Project directly or indirectly cause additional erosion and/or water body instability or	No	The project is not expected to induce or increase risk of erosion or earthquake compared the baseline scenario. The project's impact on erosion is limited since it mainly involves a tunnel as conveyance	N/A

disrupt the natural pattern of erosion? b. Is the Project's area of influence susceptible to excessive erosion and/or water body instability?		line. In order to prevent erosion in penstock route, plantation was be implemented by the Directorate of Forestry after construction works were completed.	
Principle 9.1 Landscape Modification and Soil			
Does the Project involve the use of land and soil for production of crops or other products?	No	The project site does not involve the use of land and soil for production of crops or other products.	N/A
Principle 9.2 Vulnerability to Natural Disaster			
Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	No	The project is not expected to induce or increase risk of erosion or earthquake compared the baseline scenario.	N/A
Principle 9.3 Genetic Resources			
Could the Project be negatively impacted by or involve genetically modified organisms or GMOs (e.g.,	No	The project activity generates electricity from hydropower and does not include any planting, agriculture, or similar schemes. The project activity does not threaten	N/A

contamination, collection and/or harvesting, commercial development, or take place in facilities or farms that include GMOs in their processes and production)?		human health or the environment. It is constructed and is operating in an environmental-friendly way. All the release (i.e., waste water, solid waste,) and hazard waste (i.e. waste oil) will be handled according to the relevant national legislation. The project is not negatively impacted by the use of genetically modified organisms or GMOs.	
Principle 9.4 Release of pollutants			
Could the Project potentially result in the release of pollutants to the environment?	No	The project activity does not lead to release of any pollutants.	N/A
Principle 9.5 Hazardous and Non-hazardous Waste			
Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	No	The project does not involve the manufacture, trade, release, and/or use of hazardous and non-hazardous chemicals and/or materials.	N/A
Principle 9.6 Pesticides & Fertilisers			

Will the Project involve the application of pesticides and/or fertilisers?	No	The project does not involve the application of pesticides and/or fertilisers.	N/A
Principle 9.7 Harvesting of Forests			
Will the Project involve the harvesting of forests?	No	The project does not involve the harvesting of forests.	N/A
Principle 9.8 Food			
Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	No	The project does not modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives.	N/A
Principle 9.9 Animal husbandry			
Will the Project involve animal husbandry?	No	The project does not involve animal husbandry.	N/A
Principle 9.10 High Conservation Value Areas and Critical Habitats			
Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	No	The project does not physically affect or alter largely intact or HCV ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified.	N/A
Principle 9.11 Endangered Species			

a. Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? b. Does the Project potentially impact other areas where endangered species may be present through transboundary affects?	No	The project site does not include any protected area or endemic plant species. All species in the project site are deemed as "common" and do not carry any risk of extinction or endangerment.	Fish passage's effectiveness will be assessed at each monitoring period, with photos of the passage to be provided at each monitoring year.

APPENDIX 2- CONTACT INFORMATION OF PROJECT PARTICIPANTS

Organization name	Reşadiye Hamzalı Elektrik Üretim San. Ve Tic. A.Ş.
Registration number with relevant authority	61662 – Republic of Turkey, Directorate of Commercial Registry of Ankara
Street/P.O. Box	Çukurambar Mah. 1480. Sokak
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APPENDIX 3- LUF ADDITIONAL INFORMATION

Risk of change to the Project Area during Project Certification Period:	
Risk of change to the Project activities during Project Certification Period:	
Land-use history and current status of Project Area:	
Socio-Economic history:	
Forest management applied (past and future)	
Forest characteristics (including main tree species planted)	
Main social impacts (risks and benefits)	
Main environmental impacts (risks and benefits)	
Financial structure	
Infrastructure (roads/houses etc):	
Water bodies:	
Sites with special significance for indigenous people and local communities - resulting from the Stakeholder Consultation:	
Where indigenous people and local communities are situated:	
Where indigenous people and local communities have legal rights, customary rights or sites with special cultural, ecological, economic, religious or spiritual significance:	

APPENDIX 4-SUMMARY OF APPROVED DESIGN CHANGES

Please refer to Design Change Requirements for more information on procedures governing Design Changes

Revision History

Version	Date	Remarks
1.2	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Inclusion criteria table added Gender sensitive requirements added Prior consideration (1 yr rule) and Ongoing Financial Need added Safeguard Principles Assessment as annex and a new section to include applicable safeguards for clarity Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on Stakeholder Consultation information required Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.1	24 August 2017	Updated to include section A.8 on 'gender sensitive' requirements
1.0	10 July 2017	Initial adoption