Gold Standard for the Global Goals
Key Project Information & Project Design Document (PDD)

Version 1.1 – August 2017

KEY PROJECT INFORMATION

Title of Project:	Antalya Solar Power Plant
Brief description of Project:	Antalya SPP is a large scale solar power project having total capacity of 23.40 MW. It is located in Akseki district of Antalya, Turkey. The expected energy generation is about 46,736,532 kWh per year and the estimated CO_2 avoidance is 25,461 tonnes per annum.
Expected Implemetation Date: Expected duration of Project:	01/2021 49 years
Project Developer:	GTE
Project Representative:	Gün Güneş Enerjisi Elektrik Üretim Sanayi ve Ticaret A.Ş
Project Participants and any communities involved:	GTE (Project developer) Gün Güneş Enerjisi Elektrik Üretim Sanayi ve Ticaret A.Ş (Project owner)
Version of PDD: Date of Version:	03 13/09/2021
Host Country / Location:	Turkey / Antalya province / Akseki district
Certification Pathway (Project Certificatin/Impact Statements & Products	GS VER
Activity Requirements applied: (mark GS4GG if none relevant)	RE Activity Requirements (GS4GG)
Methodologies applied:	ACM0002 - "Grid connected electricity generation from renewable sources" - Version 20.0
Product Requirements applied:	GHG Emission Reduction
Regular/Retroactive:	Retroactive
SDG Impacts:	- Affordable and Clean Energy (SDG 7): Increasing the number and pectentage of renewable energy power plants such as solar power plants will provide substantial increase in the share of renewable energy in the global energy mix and ensure universal access to affordable, reliable and modern energy services. The average annual clean energy generation is expected to be 46,736,532 kWh. - Decent Work and Economic Growth (SDG 8): The project will generate employment and income. All employees will be provided with the required trainings and certification depending on the duties of their own. The project is expected to create job opportunity for 20 people during construction and 10 people in operation period. - Climate Action (SDG 13): Renewable energy power plants such as Antalya SPP, will contribute to "Emissions Reductions or Removals and/or Adaptation to Climate Change" by reducing CO2 emissions caused by fossil fuel-fired power plants that are displaced due to the project activity, in line with GS4GG principles. The project will contribute to SDG Target 13.a an expected amount of 25,461

	tonnes of CO_2e.
Estimated amount of SDG Impact Certified	25,461 tCO_2e

SECTION A. Description of project

A.1. Purpose and general description of project

Antalya SPP will be developed by Gün Güneş Enerjisi Elektrik Üretim Sanayi ve Ticaret A.Ş. The project is reducing national energy deficit and development of local industries as it allows the use of local sources for energy generation to meet the increasing demands.

The purpose of the project is to generate clean energy by harnessing the solar power and providing the energy to the Turkish national grid. By implementing the project, investors also aim to reduce dependency to the fossil fuels thereby reducing the sources of environmental pollution.

In this scope, Gün Güneş Enerjisi Elektrik Üretim Sanayi ve Ticaret A.Ş plans to install PV panels having a module area of 182,153 m^2 in Akseki District of Antalya with the purpose of contributing to the national economy the meeting the increased electricity demand.[1] Total output of the plant will be limited at 23.40 MWe as per the capacity allowed in generation license.

The project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants connected to Turkish National Power Grid. The average annual generated energy of 46,736,532 kWh, will be able to deliver a reduction in emissions of around 25,461 tCO_2e (tons of c arbon dioxide equivalent) per annum.

Main goals of the Antalya SPP include;

• Utilization of the solar potential of Turkey in order to meet increasing electricity demand and maintain energy security. In total, the solar energy capacity of Turkey is lower than 7% of the total installed capacity.[2]

• Reduction of GHG emissions through increasing share of renewable resources.

• Contribution to economic development by creating direct and indirect job opportunities during construction and operation phases.

• Reduction of import dependency on fossil fuel weighed electricity sector and diversify generation mix through use of local resources.

• Contribution to sustainable development through supporting local community and local economy.

In terms of local benefits, the project mainly contributes to the reduction of local air pollutants and local employment.

Table 1. Milestones for Antalya SPP

Milestone	Date
Preliminary Licence	03/11/2016
EIA Stakeholder Meeting	02/2017
Environmental Impact Assessment (Final)	10/2017

[1] Antalya SPP Yield Report

[2] https://www.enerji.gov.tr/tr-TR/Sayfalar/Elektrik

Environmental Impact Assessment Approval	29/10/2017
PV Module Agreement *	16/12/2020
Expected Commissioning Date**	01/2021

**Project start date*

*** Project implementation date*

A.2. Eligibility of the project under Gold Standard

General Eligibility Criteria:

Scale of the project activity: The project is a 23.40 MWe solar power project and exceeding the 15 MW limit for small scale project according to UNFCCC regulations, the project is categorized under large scale.

Host Country: As Turkey, the host country, has no cap on GHG emissions, the GS VERs don't need to be backed up by allowances or other denominated units resulting in local authorities stating that an equivalent amount of allowances will be retired to back up the GS VERs issued. The project will be registered and seek approval from the national registry on GHG emission reduction projects as regulated by Communique on Procedures for Registration of Greenhouse Gas Emission Reduction Projects[3].

Type of the project activity: The proposed projects fits into 'Renewable Energy Supply' category as defined generation and delivery of energy services from non-fossil and non-depletable sources as solar being one.

Greenhouse Gases: The project activity complies with Gold Standard and UNFCCC eligibility criteria as reducing carbon dioxide emission that is mainly produced by the Turkish Grid dominated by fossil fuel power plants.

Official Development Assistance: As Turkey being a part of the DAC list of ODA Recipients of OECD[4], a written declaration of non-ODA for the project activity will be submitted.

Other Certification Schemes: The project doesn't claim Green or White certificates or equivalents that may result in double counting as a result of carbon dioxide emission reduction purposes.

Renewable Energy Activity Requirements:

• 2.1 Principle-1: Contribution to Climate Security & Sustainable Development: Project contributes 3 SDSs including SDG 13. Please see Section B 6.1.

• 2.2 Principle-2: Safeguarding Principles: Please see Section D.

• 2.3 Principle-3: Stakeholder Inclusivity: Please see Section E.

• 2.4 Principle-4: Demonstration of Real Outcomes: Please see Section B 6.4.

• 2.5 Principle-5: Financial Additionality & Ongoing Financial Needs: Please see Section B.5.

A.3. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

Gün Güneş Enerjisi Elektrik Üretim Sanayi ve Ticaret A.Ş is the legal owner of the products and all legal rights of the project.

[3] http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=9.5.14195&MevzuatIliski=0&sourceXmlSearch=

[4] http://www.oecd.org/dataoecd/9/50/48858205.pdf

A.4. Location of project

A.4.1. Host Country

Turkey

A.4.2. Region/State/Province etc.

Antalya

A.4.3. City/Town/Community etc.

Akseki district

A.4.4. Physical/Geographical location

The proposed project is located in Büyükalan Neighbourhood in Akseki district of Antalya province. The total area of the project is 370,686.94 m².[5]

Figure 1. Project area[6]

[5] Antalya SPP EIA, page xi

[6] Antalya SPP EIA, page 5

Figure 2. Closest settlements to the project area[4]

A.5. Technologies and/or measures

First Solar FS-4102-2 type PV modules will be used in the project. Technical properties of the modules are represented below:

MECHANICAL DESCRIPTION	
Length	1200mm
Width	600mm
Weight	12kg
Thickness	6.8mm
Area	0.72m²
Leadwire	2.5mm², 610mm
Connectors	MC4[9]
Bypass Diode	None
Cell Type	Thin-film CdTe semiconductor, up to 216 cells
Frame Material	None
Front Glass	3.2mm heat strengthened Series 4A™ includes anti-reflective coating
Back Glass	3.2mm tempered
Encapsulation	Laminate material with edge seal
Load Rating	2400Pa[10]

MODULE NUMBERS AND RATINGS AT STC[5,6]							
NOMINAL VALUES		FS-4105-2 FS-4105A-2	FS-4107-2 FS-4107A-2	FS-4110-2 FS-4110A-2	FS-4112-2 FS-4112A-2	FS-4115-2 FS-4115A-2	FS-4117-2 FS-4117A-2
Nominal Power (± 5%)	P_{MPP} (W)	105.0	107.5	110.0	112.5	115.0	117.5
Voltage at P_{MAX}	V_{MPP} (V)	67.8	68.6	69.4	70.2	70.5	71.2
Current at P_{MAX}	I_{MPP} (A)	1.55	1.57	1.59	1.60	1.63	1.65
Open Circuit Voltage	V_{OC} (V)	86.0	86.6	87.2	87.7	87.8	88.2
Short Circuit Current	I_{SC} (A)	1.74	1.75	1.75	1.75	1.78	1.79
Module Efficiency	%	14.6	14.9	15.3	15.6	16.0	16.3
Maximum System Voltage	V_{SYS} (V)	1500 [7]					
Limiting Reverse Current	I_R (A)	4.0					
Maximum Series Fuse	I_{CF} (A)	4.0					
MODULE NUMBERS AND RATINGS AT 800W/m², NOCT[8] 45°C, AM 1.5 [6]							
Nominal Power (± 5%)	P_{MPP} (W)	78.3	80.1	82.0	83.9	85.8	87.6
Voltage at P_{MAX}	V_{MPP} (V)	62.6	63.1	64.1	65.0	65.5	65.9
Current at P_{MAX}	I_{MPP} (A)	1.25	1.27	1.28	1.29	1.31	1.33
Open Circuit Voltage	V_{OC} (V)	81.0	81.6	82.1	82.6	82.7	83.1
Short Circuit Current	I_{SC} (A)	1.40	1.41	1.41	1.41	1.44	1.44
TEMPERATURE CHARACTERISTICS							
Module Operating Temperature Range	(°C)	-40 to +85					
Temperature Coefficient of P_{MPP}	T_K (P_{MPP})	-0.34%/°C					
Temperature Coefficient of V_{OC}	T_K (V_{OC})	-0.29%/°C					
Temperature Coefficient of I_{SC}	T_K (I_{SC})	+0.04%/°C					

The project will be connected to the National Grid by 154 kV transmission line via Akseki Substation.[7]

A.6. Scale of the project

For the purpose of applying UNFCCC methodologies for quantification of GHG reductions, '*small scale*' is defined as Renewable Energy Project with installed capacity less than equal to 15 MWe or 45 MWth[8]. Therefore, project is considered to be a '*large scale'* project with 23.40 MWe.

A.7. Funding sources of project

Project will be funded by company's own resources.

A.8. Assessment that project complies with 'gender sensitive' requirements

- *Does the project reflect the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?*

As stated in Gold Standard Gender Policy document, "foundational gender sensitive certificiation" which is mandatory for every project requires compliance with the gender 'do no harm' safeguard, gender-gap analysis and gender sensitive stakeholder consultations. Although the project is a renewable energy project and does not have negative impacts on men and women, it complies with the criteria mentioned.

[7] Antalya SPP EIA, page xi

[8] https://www.goldstandard.org/project-developers/standard-documents

Moreover, Turkey has ratified ILO convention 100 and 111[9] and discrimination based on gender is illegal in Turkey. The project try to align with the national gender strategy. So, the project does not involve and is not complicit in any form of discrimination based on gender difference.

- *Does the project align with existing country policies, strategies and best practices?*

The project aims to create new employment and income opportunities within the scope of SDG 8 . While doing this, a gender-equal strategy is implemented by creating employment opportunities for both man and woman without discrimination. According to the Woman Empowerment Strategy Paper and Action Plan prepared by the Ministry of Family and Social Policies (2018), there are 21 targets classified under 5 main fields in order to enhance participation of women to the society.[10] In this action plan regarding the years 2018 – 2023, economy and employment-oriented strategies are represented for women since the labor force activity of women is not at desired level compared to the EU countries. According to 2017 statistics tabulated in the report, labor force activity of women is declared as 33.6%[11] and it is aimed that this percentage will be 41% in 2023.[12] Accordingly, the project shows parallelism with the national strategies developed for women.

- *Does the project address the questions raised in the Gold Standard Safeguarding Principles & Requirements document?*

Yes, the project considers all questions indicated in the Gold Standard Safeguarding Principles & Requirements. Please see Section D for assessment questions, justifications and mitigation measures.

- *Does the project apply the Gold Standard Stakeholder Consultation & Engagement Procedure, Requirements & Guidelines?*

LSC has not been held yet. However, it will be done according to the Gold Standard procedures.

SECTION B. Application of selected approved Gold Standard methodology

B.1. Reference of approved methodology

The United Nations approved consolidated baseline methodology applicable to this project is ACM0002 "Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources" Version -20[13].

ACM0002 refers to the following tools:

[9] https://www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-ankara/documents/genericdocument/wcms_645630.pdf

[10] http://www.sp.gov.tr/upload/xSPTemelBelge/files/RySPo+KADININ_GUCLENMESI_STRATEJI_BELGESI_VE_EYLEM_PLANI_2018-2023_.pdf, Page 17

[11] http://www.sp.gov.tr/upload/xSPTemelBelge/files/RySPo+KADININ_GUCLENMESI_STRATEJI_BELGESI_VE_EYLEM_PLANI_2018-2023_.pdf, Page 76

[12] http://www.sp.gov.tr/upload/xSPTemelBelge/files/RySPo+KADININ_GUCLENMESI_STRATEJI_BELGESI_VE_EYLEM_PLANI_2018-2023_.pdf, Page 79

[13] https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

- "Tool for the demonstration and assessment of additionality", Version 7[14] and,
- "Tool to calculate the emission factor for an electricity system", Version 7[15].

B.2. Applicability of methodology

The choice of methodology ACM0002, is justified as the project activity meets its applicability criteria:

• Antalya SPP is a large scale solar power type, greenfield, grid connected renewable electricity generation project.
• The project does not involve switching from fossil fuel use to renewable energy at the site of the project activity.
• The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

B.3. Project boundary

The project boundary is considered as the National Electricity Grid of Turkey according to applied tool. The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the power plant is connected to.

The project does not involve any other emissions sources not foreseen by the methodologies. The greenhouse gases and emission sources included in or excluded from the project boundary are shown in table below.

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. Excluded for simplification
		N_2O	No	Minor emission source. Excluded for simplification
Project scenario	Source 1	CO_2	No	N/A. It is a renewable energy energy (solar) project.
		CH_4	No	N/A. It is a renewable energy energy (solar) project.
		N_2O	No	N/A. It is a renewable energy energy (solar) project.

B.4. Establishment and description of baseline scenario

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

14 https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

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

Turkish electricity generation is mainly composed of thermal power plants and the share of renewable resources; especially hydroelectric power plants have decreased significantly in recent years whereas share of soalr power plants are still very low. Since Turkey is an advanced developing country, there is an increasing demand for electricity which is fully expected to continue in the foreseeable future.

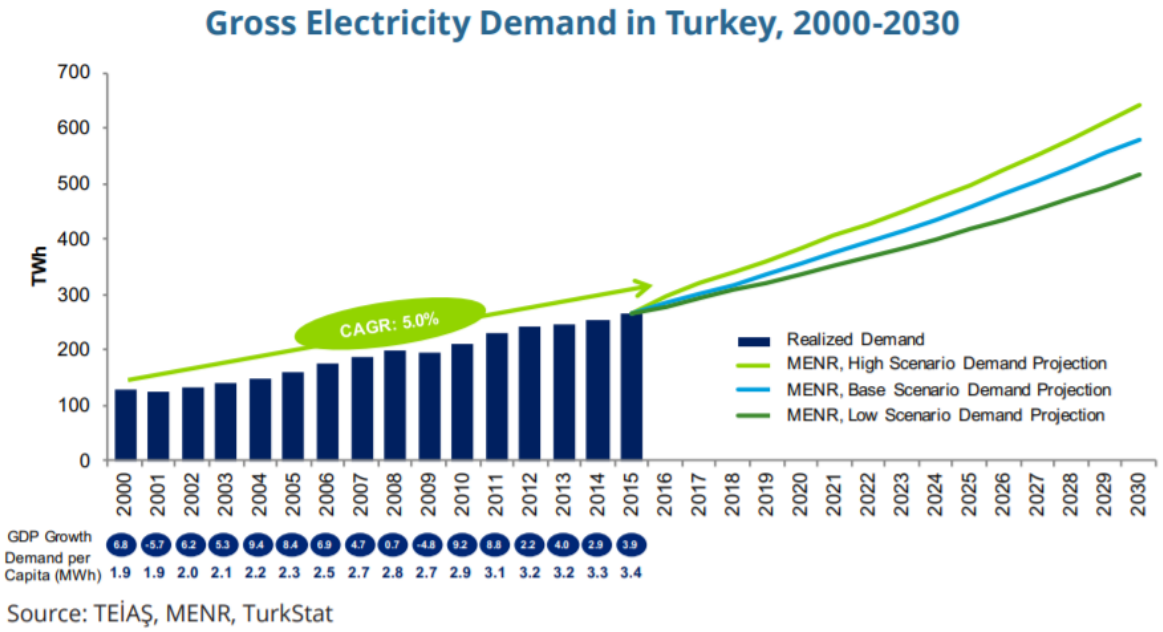

Figure 3. Projection of Turkey's electricity demand[16]

The trend in Turkey to date and given historically slow development of alternative energy resources is to build an increasing number of thermal power plants in the future to satisfy the annual growth in energy consumption demand. Turkey as an advanced developing nation has looked at dealing with energy security by developing and constructing high capacity coal and natural gas power plants. The development of thermal power plants has been also encouraged by the large natural resource availability in Turkey, especially the abundance of economically accessible lignite.

In the absence of the project activity, the same amount of electricity is required to be supplied via either the current power plants or by increasing the number of thermal power plants thus increasing GHG emissions.

According to the Ministry of Energy and Natural Resources statistics[17], share of SPPs could hardly reach 6.6% in 2019 whereas share of natural gas and coal was around 51% together. When we look at the annual development of Turkey's gross generation in recent years we see that grid is dominated by thermal power plants and which is boosted by increasing energy demand in parallel to increase population and per capita income. Hence, baseline of Turkey's electricity grid will continue to be dominated by fossil fuel power plants which is seen as the quickest solution in short term to meet the demand and enable energy security in supply side.

B.5. Demonstration of additionality

[16] https://www.dunyaenerji.org.tr/wp-content/uploads/2017/10/turkish-energy-market-outlook.pdf

[17] https://www.enerji.gov.tr/tr-TR/Sayfalar/Elektrik

Specify the methodology or activity requirement or product requirement that establish deemed additionality for the proposed project (including the version number and the specific paragraph, if applicable).	Selected methodology: ACM0002, Version 20.0 "Large-scale consolidated methodology for grid-connected electricity generation from renewable sources" Tools: "tool to calculate the emission factor for an electricity system, version 7" & "tool for assessment and demonstration of additionality, version 7 " The baseline scenario for the project has been defined as "generation of equal amount of electricity by the power plants connected to the grid". Emission factor for the baseline scenario has been calculated according to the combined margin approach as defined by the selected methodology.
Describe how the proposed project meets the criteria for deemed additionality.	Within this framework, the project is expected to generate about 46,736,532 kWh electricity and reduce about 25,461 tCO_2 emissions through replacing the electricity that would need to be supplied via the national grid in the absence of the project activity. Additionality of the proposed project has been assessed according to the applied tool for demonstration of additionality as shown in following steps.

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

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

The most realistic and reliable alternatives to the project activity are:

1. Proposed project is not undertaken as a VER project activity
2. Continuation of the current situation-supply of equal amount of electricity by the newly built grid connected power plants

The first alternative, which is the implementation of the project without carbon revenue is not financially attractive as discussed in investment analysis section below. The Second alternative (Scenario 2) is the baseline scenario and implementation of the proposed project as a VER activity would be additional to this scenario. Continuation of the current situation is not considered as a realistic alternative due to increasing electricity demand therefore new power plants should be constructed which includes mainly thermal power plants. Implementation of the project is additional to the baseline scenario which is alternative 2 above and therefore reduces the emissions.

Outcome of Step 1a

Continuation of the current situation is not considered as a realistic alternative due to increasing electricity demand therefore new power plants should be constructed which includes mainly thermal power plants. Implementation of the project is additional to the baseline scenario which is an alternative 2 above and therefore reduces the emissions.

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

The following applicable mandatory laws and regulations have been identified:

1. Electricity Market Law[18]
2. Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[19]
3. Energy Efficiency Law [20]
4. Forest Law[21]
5. Environment Law[22]

The resultant alternatives to the project as outlined in Step (1a) are in compliance with the applicable laws and regulations.

Outcome of Step 1b

Mandatory legislation and regulations for each alternative are taken into account in sub-step 1b. Based on the above analysis, the proposed project activity is not the only alternative amongst the project participants that is in compliance with mandatory regulations. Therefore, the proposed VER project activity is considered as additional.

Step 2 - Investment analysis

The investment analysis has been done in order to make an economic and financial evaluation of the project. No public funding or ODA are available in Turkey for finance of this type of projects.

Sub-step 2a **- Determine appropriate analysis method**

There are three options for the determination of analysis method which are:

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

Since project generates economic benefits from sales of electricity, the simple cost analysis is not applicable. Also, since the baseline of the project is generation of electricity by the grid, no alternative investment is considered at issue. So, it has been decided to use benchmark analysis for evaluation of the project investment.

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

18 Law number 6446, Published in official gazette No. 28603 on 30/03/2013 http://www.mevzuat.gov.tr/MevzuatMetin/1.5.6446.pdf

19 Law number 5346, Published in official gazette No. 25819 on 18/05/2005 http://www.mevzuat.gov.tr/MevzuatMetin/1.5.5346.pdf

20 Law number 5627, Published in official gazette No. 26510 on 02/05/2007 http://www.mevzuat.gov.tr/MevzuatMetin/1.5.5627.pdf

21 Law number 6831, Published in official gazette No. 9402 on 08/09/1956 http://www.mevzuat.gov.tr/MevzuatMetin/1.3.6831.pdf

22 Law number 2872. Published in official gazette No. 18132 on 11/08/1983 http://www.mevzuat.gov.tr/MevzuatMetin/1.5.2872.pdf

For benchmark analysis, figure defined by World Bank for similar project types have been used which has been given as 25% in the "Implementation Completion and Results Report" (Report No: ICR00004069, page 40).[23] For the proposed project, in order to reach this equity IRR values, average electricity tariff must be above 19.3 $c/kWh in the absence of carbon revenue and assuming that initial investment figures are realized so that the investment will become reasonable.

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

Parameters	Unit	Data Value
Installed Capacity[24]	MWe	23.40
Grid Connected output[25]	kWh	46,736,532
Capital Investment	$	~23,870
Income tax rate	%	22
Feed in Tariiff/Market price after 10th years	$ Cents/kWh	13.3/6.18
Expected VERs price[26]	$/ tCO_2e	3

Table 2. Main financial parameters used for investment analysis

Internal Rate of Return (IRR) of the proposed project has been calculated as 14.97% based on the parameters given above without considering the carbon revenue. Project does not use any ODA or government incentive. Electricity tariff has been used as $13.3 Cent/kWh for first 10 years and 6.18 $ Cent/kWh after 10 year. Annual generation has been taken as 46,736,532 kWh as indicated in the licence.

Acceptable IRR values for energy investments in Turkey are, given the present economic uncertainty, are expected at yields in excess of 15% per annum. Considering the market price risk, it can be concluded the extension will make the investment more feasible however, it will still be below the benchmark IRR.

Sub-step 2d - Sensitivity Analysis

Sensitivity analysis had been carried out for three main parameters identified for the first phase of the project. However, since the investment cost for extension is based on signed agreements and operating cost is not changed after extension, which is a conservative approach, only impact of change in tariff has been included in sensitivity analysis.

- Investment Cost
- Operating Cost
- Electricity Sales revenue

For a range of ± 10% fluctuations in parameters above, table below has been obtained.	**-15**	**-10**	**-5**	**0**	**+5**	**+10**	**+15**
% Fluctuation							
Investment Cost	18.86	17.44	16.15	14.97	13.89	12.90	11.98
Operating Cost	15.07	15.04	15.00	14.97	14.94	14.91	14.88

[23] http://documents.worldbank.org/curated/en/799701498842988254/pdf/ICR00004069-06192017.pdf

24 Antalya SPP generation license

25 Antalya SPP generation licence

[26] State of Voluntary Carbon Markets Report 2017 (as the average voluntary offset price of 2017

Electricity Income	11.61	12.73	13.85	14.97	16.01	17.22	18.35

Table 3. Sensitivity analysis for Antalya Solar Power Plant Project (without carbon revenue)

Outcome of Step 2:

The investment and sensitivity analysis shows that the VER revenues will improve the financial indicators of the Project remarkably. Considering that figures above are based on a higher price rather than the government guaranteed floor price, optimistic estimations for yearly generation and that those figures do not reflect the risk for investment, role of carbon income is a most significant number to enable the project to proceed.

According to local regulations, electricity price is determined daily according to Market Financial Settlement Centre (MFSC) as defined in the regulations and there exists three tariffs during day, peak and night hours. Thermal power plants and HEPPs with storage facilities have flexibility to schedule their generation at peak hours when the tariff is high. However, solar power plants do not have storage facility therefore may not be able to benefit from high prices realized at when demand is high. According to MFSC figures, electricity tariff fluctuated between 4.3 $c/kWh and 8.6 $c/kWh between 01/04/2014 and 01/02/2016 whereas the weighted average of the tariff has been calculated as 6.2 $c/kWh in this period (**Figure 4**). The value does not provide any guarantee about the actual selling price as the control on generation period and tariff is limited and it may not be possible to generate and sell electricity during peak tariff periods. Also, considering that fluctuation in solar power exist and fact that a part of the electricity can be sold through bilateral agreements to free consumers with a discount rate over market price, guarantee price has been taken as reference in investment analysis which also provides input for evaluation of financing institutions.

Another important parameter affecting equity IRR is investment cost. However, since the agreements have been made and costs are realized as given in financial model, there is no chance to expect a decrease in the investment cost. Operating costs can also affect the equity IRR however, its impact is not significant and does not cause any significant change in equity IRR and the fluctuation percentage to reach the benchmark is very high and not likely. Based on the above information, it is seen that project is not the most attractive option. Therefore project is considered as additional to the baseline scenario.

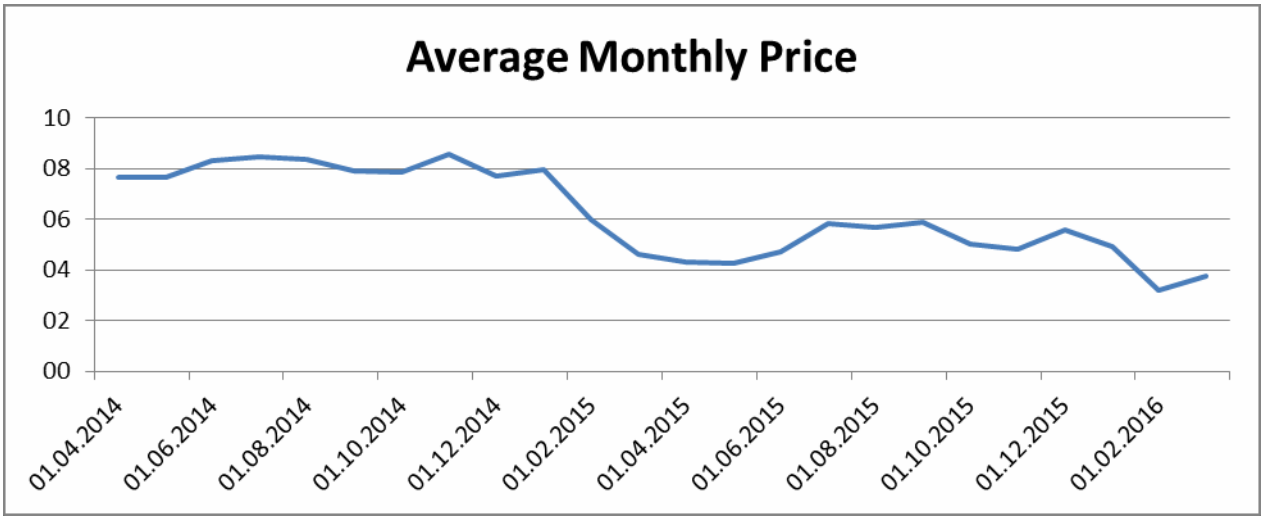

Figure 4. Highest tariffs observed between 01/04/2014-01/02/2016 ($ cents/kWh)

Step 3. Barrier analysis

This step is not applied as per the tool.

Step 4. Common Practice Analysis

According to the "Tool for the demonstration and assessment of additionality", Version 07.0.0", the common practice shall provide an analysis of any other activities that are similar to the Project Activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing etc.

According to latest statistics published by General Directorate of Energy Affairs, there are 7 solar power projects developed or had additional capacity in 2018[27].

Guidelines on Common Practice version 03.1[28] has been followed .

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

The total capacity of the proposed project is 23.40 MWe. Therefore, the applicable output range is from 11.70 MWe to 35.10 MWe.

Step 2: identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:
(a)The projects are located in the applicable geographical area;
(b)The projects apply the same measure as the proposed project activity;
(c)The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d)The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e)The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Applicable geographical area has been selected as the whole host country (Turkey) as per paragraph 1 of Guidelines on Common Practice version 03.1. Projects which apply the same measure as the proposed project have been determined and solar energy projects are selected as the same energy source type of projects. All of the selected plants deliver the same service which is the electricity generation. Applicable output range has been determined and all of the power plants are taken from the latest available year 2018. General Directorate of Energy Affairs and EMRA Electricity Production Licence Database have been used as a main resource. Therefore all of the compared power plants have been operational before the implementation of the project activity.

Below is a list of operational solar power plants as given by the General Directorate of Energy Affairs indicates that 2018 investments (counted as 7):

Table 4. Operational solar power plants (2018 investments)

NAME OF THE PLANT	INSTALLED CAPACITY (MWe)	ANNUAL GENERATION (GWh)

[27] https://www.eigm.gov.tr/tr-TR/Sayfalar/Enerji-Yatirimlari

[28] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf

RENOE ACIPAYAM GES	10.00	20.00
HAMAL GES	9.00	17.90
OMICRON ENGIL 208 GES	9.95	19.90
OMICRON ERCIS GES	9.95	19.90
YAYSUN GES	9.98	19.96
MT GES	9.98	19.96
ME-SE GES	9.90	19.80

However, there is no such a solar power plant which is in the range determined for Antalya SPP (i.e. 11.70 MW to 35.10 MW). Details are given in common practice analysis submitted to DOE and GS.

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

Since there is no solar power plant included by the range;

Nall = 0

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

There is no different scale and different to the technology project therefore Ndiff=0

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

F=1-Ndiff/Nall=1-(0/0) = 1 (> 0.200)
Nall – Ndiff = 0 – 0 = 0

According to "Tool for Common practice", Version 03.1, if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3, then the proposed project is a "common practice".

Hence, the proposed project is additional.

Given the fact that all there is no plants similar to the proposed project and built without carbon revenue, the proposed type of project should not be considered as a common practice in Turkey.

B.6. Sustainable Development Goals (SDG) outcomes

B.6.1. Relevant target for each of the three SDGs

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

Relevant target of the goal (7.2): By 2030, increase substantially the share of renewable energy in the global energy mix.

According to related goal, increasing the number and pectentage of renewable energy power plants such as solar power plants will provide substantial increase in the share of renewable energy in the global energy mix and ensure universal access to affordable, reliable and modern energy services.

Goal 8: Decent Work and Economic Growth

Relevant target of the goal (8.5): "By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value"

The Project will generate employment and income The project is expected to create job opportunity for 20 people during construction and 10 people in operation period.

Relevant target of the goal (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"

Training (including H&S) & Other Certification process required by certain necessary professions is to be provided to employees to protect human health&rights and develop. Hence, project contributes awaraness of labour rights and safety precautions.

Goal 13: Take urgent action to combat climate change and its impacts

Relevant target of the goal (13.3): Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

Renewable energy power plants such as Antalya SPP, will contribute 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. The Project will contribute to SDG Target 13.3 through an expected amount of 25,461 tonnes of CO_2e, which represent direct and quantifiable impact on climate security.

B.6.2. Explanation of methodological choices/approaches for estimating the SDG outcome

SDG 7 : Affordable and Clean Energy (Ensure access to affordable, reliable, sustainable and modern energy for all)

The baseline for the project is no project, thus leading to generation in the relevant grid which is dominated by fossil fuel and this is one of the methodological reason for choosing simple OM method to calculate emission factor. The clean energy generated by the project is calculated based on the amount of electricity generated by the project per annum. The project is expected to generate 46,736,532 kWh of clean energy per annum and contributes to share of low-cost / must-run sources. Hence, contribution of the project could be followed via indicator 7.2.1 "Renewable energy share in the total final energy consumption" and following target: 7.2 "By 2030, increase substantially the share of renewable energy in the global energy mix". This project increases the renewable energy sharing of global energy mix and contribute to improved air quality by reducing air pollution.

SDG 8 : Decent Work and Economic Growth (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all)

The project is expected to create job opportunity for 20 people during construction and 10 people in operation period. It contributes to decent work and economic growth and also quality of employment via

providing required trainings. Employment and training record will be used for checking the SDG 8 outcome.

SDG13 : Climate Action (Taking urgent action to combat climate change and its impacts):

The project leads to mitigation of 25,461 tCO_2 per annum.

The Emission Factor has been calculated in a conservative manner as requested by the methodology. The basic assumptions made are;

- Emission factor will remain same over the crediting period,
- Emission factor of fuels sources is "0" or the lowest value in the references when there is no information available.

The additionality assessment of the project activity has been demonstrated using the latest version of the "Tool for assessment and demonstration of additionality, ver 7".

According the "Tool to calculate the emission factor for an electricity system", ver. 7, the following four methods are applicable to calculate the operating margin:

a) Simple OM,
b) Simple adjusted OM,
c) Dispatch Data Analysis OM and
d) Average OM.

Since the share of low-cost / must-run sources is below 50%, method (d) is eliminated. Also due to insufficient data available, methods (b) and (c) are not considered and thus (a) simple OM method is used in calculations. The following table is used for demonstrating the share of low cost/must run resources.

Simple Adjusted OM equation becomes equivalent to the equation for (a) Simple OM method (option A). In another meaning options to calculate operating margin reduced to two options which are Simple OM_Option A and Simple OM_Option B and equations of both of them given below. In the last case for operating margin calculation, due to availability of necessary data Simple OM_Option B was used for the emission reduction calculations of this project.

Simple OM_Option A, equation:

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \; x \; EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Simple OM_Option B, equation:

$$EF_{grid,OMsimple,y} = \frac{\sum_m FC_{i,m,y} \; x \; NCV_{i,y} \; x \; EF_{CO2,i,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m = All power units serving the grid in year y except low-cost/must-run power units
y = The relevant year as per the data vintage chosen in Step 3
$FC_{i,m,y}$ = Amount of fuel type i consumed by power unit m in year y (Mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fuel type i in year y (GJ/mass or volume unit)
$EFCO_{2,i,y}$ = CO_2 emission factor of fuel type i in year y (t CO_2/GJ)

The methodology has been applied in a conservative manner. Tools addressed by the applied methodology have been used to calculate baseline, project and leakage emissions. The equations used are:

Emission Factor

EFgrid, BM, y = ΣmEGm,y . EF ELm,y / ΣmEGm,y
$EF_{grid, CM, y}$ = (W_{OM} . EF_{grid}, OM, y) + (wBM . EFgrid, BM, y) 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)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (t CO_2/MWh) m = Power units included in the build margin
Y = Most recent historical year for which electricity generation data is available W_{OM} = Weighting of operating margin emission factor (per cent)
W_{BM} = Weighting of build margin emission factor (per cent)

Baseline Emission BEy = EGPj, y . EFgrid,CM,y Where:
BEy = 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)
$EF_{grid,CM,y}$ = 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)
PD = Power density of the project activity (W/m^2)

These emissions shall be accounted for as project emissions by using the following equation: PEy = PEFF,y + PEGP,y + PEHP,y

Where:

PEy = Project emissions in year y (t CO_2 /yr)
$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (t CO_2/yr)
$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (t CO_{2e}/yr)
$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (t CO_{2e}/yr)
The proposed project activity involves the generation of electricity by a solar power plant, therefore parameters $PE_{GP,y}$ and $PE_{HP,y}$ are not applicable. According to the applied methodology: "For all renewable energy power generation projectactivities, emissions due to the use of fossil fuels for the backup generator can be neglected."Since the project is classified as a renewable energy project, parameter $PE_{FF,y}$ is neglected.

Therefore;
PEy = 0

Leakage Emissions:

The energy generating equipment is not transferred from or to another activity. Therefore leakage is also considered as "0".
LEy = 0

Emission Reductions:

Emission reductions are calculated as follows: ERy = BEy - PEy- LEy

Where:
ERy = Emission reductions in year y (t CO_2 /yr) BEy = Baseline emissions in year y (t CO_2/yr) PRy = Project emissions in year y (t CO_{2e}/yr)
LEy = Leakage emissions in year y (tCO_2/yr)
Since PEy = 0, LEy = 0

ERy = BEy

B.6.3. Data and parameters fixed ex ante for monitoring contribution to each of the three SDGs

Relevant SDG Indicator	7.2.1 "Renewable energy share in the total final energy consumption" 13.3.2 "Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions"
Data/parameter	$EG_{m,y}$
Unit	MWh
Description	Net electricity generated by power plant/unit m, k or n (or in the project electricity system in case of EGy) in year y
Source of data	For gross generation, imported values, internal consumption and net generation which not including low-cost/must run power plants in year y followed documents are used which can be checked via shared link: https://www.teias.gov.tr/tr/iii-electricity-generation-consumption-losses-0 and the documents listed below: -"Annual Development of Turkey's Gross Electricity Generation by Primary Energy Resources and The Electricity Utilities" -"Annual Development of Turkey's Gross Electricity Generation-Imports-Exports and Demand" -"Annual Development of Electricity Generation- Consumption and Losses in Turkey"
Value(s) applied	For 2015: 178,430,451 MWh For 2016: 183,767,486 MWh For 2017: 205, 532, 639 MWh For 2018: 202,323,104 MWh 770,053.680 MWh net electricity generation between 2015-2018.
Choice of data or Measurement methods and procedures	Data from Grid Operator has been used.
Purpose of data	Used in the calculation of operating margin.

Additional comment	Detailed calculation of applied values are given in the CM calculation excel sheet in "OM Calculations" Tab.

B.6.4. Ex ante estimation of outcomes linked to each of the three SDGs

According to the "Tool to calculate the emission factor for an electricity system", Version 7, a project electricity system has to be defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity, and that can be dispatched without significant transmission constraints. Therefore, in this project activity the project electricity system includes the project site and all power plants attached to the Interconnected Turkish National Grid, which has a gross generation about 297,277.53 GWh by 2018.
For imports from connected electricity systems located in another host country (ies), the emission factor is taken as "0" tCO2/MWh as requested by the methodology.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)
Option I has been chosen by the project developer hence only grid power plants are included in calculations.

Step 3: Select a method to determine the operating margin (OM)

The Simple Operating Margin (OM) emission factor ($\mathbf{EF}_{grid, OM, y}$) is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all the generating plants serving the system, excluding low-cost/must-run power plants.
The tool gives two options for the calculation of $\mathbf{EF}_{grid, OM, y}$;

- **Ex-ante option**

A three-year generation-weighted average, based on the most recent data available at the time of submission of the VER-PDD to the DOE for validation, without the requirement to monitor and recalculate the emissions factor during the crediting period, or

- **Ex-post option**

The year in which the project activity displaces grid electricity, with the requirement to update emissions factor annually during monitoring. For this project the ex-ante approach is selected. Data for calculating the four year average is obtained from the period 2015 – 2018.

Step 4. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must run plants / units. The Simple OM has been calculated using option B which is based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system. Option B has been selected since;
• Generation and CO_2 data for individual power units are not available
• Only renewable are considered as low cost/must run resources
• Off-Grid power plants are not included in calculations.

As fuel consumption and average efficiency data for each power plant / unit are not available, Option B is used for simple OM calculation. Under Option B, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost / must run power plants / units, and based on fuel type(s), and total fuel consumption of the project electricity system, as follows:

$$EF_{Grid,OM\ simple,y} = \Sigma FC_{i,y} * NCV_{i,y} * EF_{CO2,i,y} / EG_y \quad (1)$$

where:

$EF_{grid,OM,y}$: Simple operating margin CO_2 emission factor in year "y" (tCO_2/GWh)

$FC_{i,y}$: Amount of fossil fuel type "i" consumed in the project electricity system in year "y" (mass or volume unit)

$NCV_{i,y}$: Net calorific value (energy content) of fossil fuel type "i" in year "y" (GJ / mass or volume unit)

$EF_{CO2,i,}$: CO_2 emission factor of fossil fuel type "i" in year "y" (tCO_2/GJ)

EG_y : Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must run power plants / units, in year "y" (MWh)

i : All fossil fuel types combusted in power sources in the project electricity system in year "y"

y: Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

For the calculation of the Simple OM, the amount of fuel consumption ($FC_{i,y}$) and heating values of fuels are taken from website of TEIAS, the official source of related data. Fuel consumption values for the relevant years are given in table below:

Table 5. Amount of fuels used for electricity generation[29]

Fuel Type	Fuel Consumption ($FC_{i,y}$)				
	2015	2016	2017	2018	Total 2015-2018
	Ton or 1000 m_3 (for gas)				
Hard Coal	16,629,492	19,642,410	21,139,104	24,981,829	82,392,835
Lignite	49,940,131	60,213,772	64,412,257	73,533,486	48,099,646
Fuel Oil	516,912	526,674	317,724	225,297	1,586,607
Diesel Oil	238,388	306,393	197,219	11,776	753,776
LPG	0	0	0	0	0
Naphtha	0	0	0	0	0
Natural Gas	20,914,868	18,954,093	22,954,854	19,568,140	82,391,955

The NCV of the fuels consumed have been calculated using data from the TEIAS web page. The emission factors required for calculation of CO_2 emission coefficient have been obtained through IPCC 2006 guidelines for GHG inventories for fuels. If we sum up all emissions from each fuel type, then the total emissions in 2015-2018 is **505,239,585** tCO_2.

Table 6. Calculation of Total Emissions Generated (2015-2018)

Fuel Type	Net Calorific Value ($NCV_{i,y}$)	Emission Factor ($EF_{CO2,i}$)[30]	Total Fuel Consumption 2014-2016 ($FC_{i,y}$)	Total Emissions 2014-2016
	Gj/t or Gj/1000 m^3 (for gas)	tCO_2/Gj	Ton or 1000 m^3 (for gas)	tCO_2

[29] Türkiye Termik Santrallerinde Tüketilen Yakıt Miktarlarının Üretici Kuruluşlara Dağılımının Yıllar İtibariyle Gelişimi

[30] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf, page 1.23

Hard Coal	23.71	0.0895	82,392,835	174,837,666
Lignite	6.97	0.0909	48,099,646	157,092,787
Fuel Oil	44.01	0.0755	1,586,607	5,271,395
Diesel Oil	44.34	0.0726	753,776	2,426,589
LPG	0.00	0.0616	0	0
Naphtha	0.00	0.0693	0	0
Natural Gas	37.02	0.0543	82,391,955	165,611,148
TOTAL				**505,239,585**

Net electricity generated and supplied to the grid by thermal plants has been calculated by excluding internal consumption values from gross thermal generations[31]. The ratio between gross and net generation has been calculated first, and assuming that the same ratio is valid for thermal plants; gross generation by thermal power plants has been multiplied by this ratio in order to find net generation by thermal plants. The calculation of $EF_{grid,OM,y}$ requires the inclusion of electricity imports with an emission factor of 0 tCO_2/GWh. By including the imports in the electricity production this requirement is fulfilled. Summing up this with the imported electricity, total supply excluding low cost / must run sources are determined as given in table below.

Table 7. Net electricity generation between 2015-2018

Year	Internal Consumption	Gross Thermal Generation	Net Thermal Generation	Import	Net Electricity Generated (EGy)
	GWh	GWh	GWh	GWh	GWh
2015	4.5%	179,366.44	171,294.95	7,135.50	178,430.451
2016	4.5%	185,798.10	177,437.19	6,330.30	183,767.486
2017	4.4%	212,138.46	202,804.37	2,728.27	205,532.639
2018	4.7%	209,683.48	199,846.22	2,476.89	202,323.104
Average		**Total**	**751,382.72**	**18,670.96**	**770,053,680**

Having calculated the total fuels emissions and net generation by thermal power plants as given in previous two tables, The $EF_{grid, OM ,y,}$ is calculated by simply dividing total emission by total net thermal electricity generation as defined in equation (1) above;

EFgrid, OM, y = **505,239,585** tCO_2 / **770,053,680** GWh = **0.656 tCO_2/MWh.**

In calculating the EFgrid, OM, y, data for NCV has been calculated using weighted average values for each fuel.

Step 5: Calculate the build margin (BM) emission factor

The calculation of Build Margin (BM) emissions is applying 2015-2018 values. In terms of vintage of data, project participants can choose between one of the following two options to calculate $EF_{grid,BM,y}$:

Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD

[31] https://www.teias.gov.tr/tr/iii-elektrik-enerjisi-uretimi-tuketimi-kayiplar-0

submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

In this PDD, *Option1* is chosen to calculate the build margin emission factor. The sample group of power unit m is used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently (SET5-units) and determine their annual electricity generation (AEGSET-5-units, in MWh);

Table 8. List of five most recently commissioned plants in 2018 (AEGset-5-units)[32]

Name of Plant	Type of Fuel	Commissioning Date	Generation Capacity (GWh)
SELİMİYE HES	HEPP	31/12/2018	6,63
YENİHİSAR RES	WPP	30/12/2018	75,00
DÜZCE BİYOKÜTLE ENERJİ ÜRETİM TESİSİ	BIOMASS	28/12/2018	84,00
CERİT RES	WPP	28/12/2018	299,59
SWISSOTEL TERMİK KOJENERASYON SANTRALİ	NG	28/12/2018	6,62
			Total: 471,8

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG total, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG total (if 20% falls on part of the generation of a unit, the generation of that unit

[32] 2018 energy investments, https://www.eigm.gov.tr/tr-TR/Sayfalar/Enerji-Yatirimlari

is fully included in the calculation) (SET≥20%) and determine their annual electricity generation (AEGSET-≥20%, in MWh);

For determination of plants that comprise 20% of the system's generation,net generation in year 2018 which is 299,682 GWh[33] has been taken as reference and its 20% has been determined as about 49,270.5 GWh. Since 20% of the most recent year's generation does not fall partly on capacity of a plant, total capacity included in BM calculation is 55,873.0 GWh.

(c) From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation (SET sample); Identify the date when the power units in SET sample started to supply electricity to the grid. If none of the power units in SET sample started to supply electricity to the grid more than 10 years ago, then use SET sample to calculate the build margin. In this case ignore steps (d), (e) and (f).
SET≥20% is selected as (SET sample) because the set of power units that comprises the larger annual electricity generation. There is no power units in SET sample started to supply electricity to the grid more than 10 years ago. Therefore the steps (d), (e) and (f) are ignored.
The Build Margin emission factor EFgrid, BMs, y is calculated as the generation-weighted average emission factor of a sample of power plants "m" for a specific year, as follows:
EFgrid, BM, y = ΣEG,m,y . EFEL,m,y / ΣEG,m,y (2)
Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year "y" (tCO_2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit "m" in year "y" (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit "m" in year "y" (tCO_2/MWh)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available

"Tool to Calculate the Emission Factor for an Electricity System" has been used for plant efficiency data although this approach is very conservative. Since tool does not contain any specific data for plants with LPG, Naphtha etc. all of the plants consuming liquid fuels have been considered as open cycle plants. Plants using lignite and coal have been assumed as using subcritical technology, whereas natural gas plants have been assumed as combined cycle plants. The assumptions have been based on TEIAS statistics which gives heating values of fuels consumed in thermal power plants and corresponding electricity generation which shows that values used are very conservative compared to actual situation.

Table 9. Calculation of emission factors

Fuel Type	**Emission Factor ($EF_{CO2,i}$)**	**Generation Efficiency[34] ($\eta_{m,y}$)**	**Emission Factor of Power Unit ($EF_{EL,m,y}$)**
	tCO_2/Gj	**%**	**tCO_2/MWh**
Coal	0.0895	50.0%	0.644
Lignite	0.0909	39.0%	0.839
Fuel Oil	0.0755	48.5%	0.560
Diesel Oil	0.0726	48.5%	0.539
LPG	0.0616	48.5%	0.457
Naphtha	0.0693	48.5%	0.514
Natural Gas	0.0543	62.0%	0.315

[33] http://www.teias.gov.tr/sites/default/files/2018-10/46.xls
[34] TOOL09 Methodological tool: Determining the baseline efficiency of thermal or electric energy generation systems Version 02.0: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-09-v2.0.pdf

The build margin emission factor has been determined for the most recent capacity additions as shown in table below. The Build margin emission factor in the last column has been determined by multiplying each EF value with the corresponding electricity generation value for that fuel and dividing it by the total generation by the most recent capacity additions.

Table 10. Most recent capacity additions corresponding to 20% by fuel source

Fuel Type	Electricity Generated (EGm,y)					Emission Factor of Power Unit ($EF_{EL,m,y}$)	Emission by Source
	2015 (MWh)	2016 (MWh)	2017 (MWh)	2018 (MWh)	TOTAL (2015-2018)	tCO_2/MWh	tCO_2
Coal	1,067.1	1.092,2	1.346,1	224,00	3.729,4	0.644	2,403.2
Lignite	436.9	1.436,4	4,9	2.316,71	4.194,9	0.839	3,519.8
Fuel Oil	0	0,0	1.210,3	93,24	1.303,5	0.560	730.5
Diesel Oil	0	0,0	0,0	0,00	0,0	0.539	0,0
LPG	0	0,0	0,0	0,00	0,0	0.457	0,0
Naphtha	0	0,0	0,0	0,00	0,0	0.514	0,0
Natural Gas	878.1	5.066,1	10.917,4	1.147,29	18.008,8	0.315	5,678.0
Renewable (Biomass, wastes, Hydro, wind, geothermal)	7,258.2	6.212,7	6.209,8	11.581,38	31.262,1	0.000	0,0
Total	**9,640.2**	**13.807,4**	**19.688,5**	**15.362,61**	**58.498,7**	-	**12,331.5**

Finally, by summing up the weighted EF values, overall build margin emission factor have been calculated as:

$EF_{grid, BM, y}$ = 12,331.5 tCO_2 / 58,498.7 MWh = 0.211 tCO_2/MWh

STEP 6: Calculate the combined margin (CM) emission factor

Weighted average baseline emission factor is calculated as follows;

$$EF_{grid, CM, y} = w_{OM} * EF_{grid, OM, y} + w_{BM} * EF_{grid, BM, y} \quad (3)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year "y" (tCO_2/MWh) as calculated from equation (2) above.

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year "y" (tCO_2/MWh) as calculated from equation (1) above.

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

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

The default values of the weights, w_{OM} and w_{BM}, as recommended by the selected methodology are 0.5 for both components. These default values have been used in calculating CM emission factor together without rounding the values of EF_{OM} and EF_{BM}.

Based on the formula above (3), baseline emission factor is calculated as;

$EF_{grid, CM, y}$ = 0.75 *0.656 + 0.25 * 0.211 = 0.545

The combined margin emission factor is therefore 0.545 tCO_2/MWh.

The ex-ante emission reductions (ERy) are calculated as follows:

ERy = BEy – PEy - LEy **(4)**

Where:

ERy = Emission reductions in year y (tCO_2)

BEy = Baseline emissions in year y (tCO_2)

PEy = Project Emissions in year y (tCO_2)

LEy = Leakage emissions in year y (tCO_2)

Baseline emissions

Baseline emission is calculated according to the formula

BEy = EGy x EFy

Where:

EGy = Net electricity delivered to the grid by the project activity in year y excluding transmission losses of the grid

EFy = Emission factor calculated according to selected methodology

BEy =46,736.532 MWh × 0.545 tCO_2/MWh = 25,461 tCO_2

Project emissions

Since the project is classified as a renewable energy project, parameter PEFF,y is neglected.

Therefore;

PEy = 0

Leakage

The energy generating equipment is not transferred from or to another activity. Therefore leakage is also considered as "0".

LEy = 0

As a result, Total Emission Reduction is:

ERy = BEy

SGD 7

The average annual clean energy generation is expected to be 46,736,532 kWh.

SGD 8

The project is expected to create job opportunity for 20 people during construction and 10 people in operation period.

B.6.5. Summary of ex ante estimates of each SDG outcome

SDG 13

	Baseline estimate (tCO_2)	Project estimate (tCO_2)	Net benefit (tCO_2)
2021	25,461	0	25,461
2022	25,461	0	25,461
2023	25,461	0	25,461
2024	25,461	0	25,461
2025	25,461	0	25,461

Total	127,310	0	127,310
Total number of crediting years	5		
Annual average over the crediting period	25,461	0	25,461

SDG 7

	Baseline estimate (kWh)	**Project estimate (kWh)**	**Net benefit (kWh)**
2021	0	46,736,532	46,736,532
2022	0	46,736,532	46,736,532
2023	0	46,736,532	46,736,532
2024	0	46,736,532	46,736,532
2025	0	46,736,532	46,736,532
Total	0	233,682,660	233,682,660
Total number of crediting years	5		
Annual average over the crediting period	0	46,736,532	46,736,532

SDG 8

The project is expected to create job opportunity for 20 people during construction and 10 people in operation period.

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Relevant SDG Indicator/Safeguarding Principle	**SDG 7 - Indicator 7.2.1 – "renewable energy share in the total final energy consumption"** **SG Principle 4.1.2 Climate**
Data / Parameter	EGfacility, y
Unit	GWh
Description	Net electricity generated and delivered to the grid by the proposed project in year
Source of data	Metering devices used in power plants & monthly generation records
Value(s) applied	Estimated annual generation forming the basis for emission reduction calculation is 46,736,532 kWh

Measurement methods and procedures	Generation data is recorded by two metering devices continuously. These records provide the data for the monthly invoicing to TEIAS. Generation is recorded via remote reading system. The quantity of electricity supplied by the project plant/unit to the grid (ISVM) and the quantity of electricity delivered to the project plant/unit from the grid (EUCM) 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 measuring, monthly recording
QA/QC procedures	Two calibrated ammeters backup each other. Maintenance and calibration of the metering devices are made by TEIAS. If there is a significant difference between the readings of two devices, maintenance and tests of the metering devices and the associated equipment are done before waiting for the periodical maintenance. The meters should comply with EPDK regulations which define the accuracy class of the meters as 0.2 or 0.5 depending on the capacity of the circuit as given in document in link (http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44). Generation of the plant is cross checked from TEIAS – PMUM web site (http://pmum.teias.gov.tr) which is accessible using a password provided to electricity generation companies. ISVM (Electricity fed to the grid) and UECM (Electricity consumed from the grid) data given in PMUM records areused for emission reduction calculations.
Purpose of data	Emission reduction calculations
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	**SDG 8: Decent Work and Economic Growth** - ***8.8.1 Frequency rates of fatal and non-fatal occupational injuries, by sex and migrant status*** **Principle 3.6.1: Labour Rights**
Data / Parameter	Quality of Employment
Unit	Number of personnel certified/trained during operation phase
Description	Contribution to quality of employment by ensuring that the staff is trained and certified for the required positions
Source of data	Training Records (including H&S) & Other Certificates required by certain professions, if necessary

Value(s) applied	Some of the trainings & workshops that may be given to the respective employees are: For Construction period General Health and Safety • Emergency action plan • General work safety and legal responsibility / health and safety signs/danger and risks in working area • Work safety for lifting equipment For operation period • ISO 9000:2008 Quality Management System • ISO 14001 Environment Management System and OHSAS 18001 Health and Safety Management System • Analyzing and Assessment of Risk • SPP Rescue Training • First aid • Training of working aloft • Defensive driving • Fire extinguishing
Measurement methods and procedures	All employees will attend trainings on first aid and health & safety. For positions that require specific skills (such as high voltage equipment) staff will either be trained or certified staff will be recruited.
Monitoring frequency	Annually
QA/QC procedures	The training programmes help increase the efficiency of the workforce and provides employees skilled at their job. This not only helps the company but to self-improvement of individual employees.
Purpose of data	To monitor the contribution to SDG 8 and Principle 3.6.1.
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	**Principle 4.2.2 Climate and Energy**
Data / Parameter	Soil Condition
Unit	-
Description	Controlling the risk of erosion
Source of data	Site observations during visits
Value(s) applied	Erosion control will be set by intensifying local characteristics.[35]
Measurement methods and procedures	Soils resistance to erosion will be improved.
Monitoring frequency	Once in the fist verification
QA/QC procedures	-
Purpose of data	To monitor the erosion control by intensifying local characteristics of the soil.

[35] Antalya SPP EIA, page 97

Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	**Principle 4.3.4 Release of pollutants**
Data / Parameter	Water Quality and Quantity
Unit	-
Description	Appropriate disposal of wastewater as required by the Law on Water Pollution Control
Source of data	Assessing collection methods during site visits and checking waste disposal records.
Value(s) applied	During construction period, no wastewater production in the baseline scenario
Measurement methods and procedures	Collection methods and waste disposal records will be checkhed during site visits.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	To monitor the contribution to Principle 4.3.4.
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	**SDG12: Responsible Consumption and Production** **Principle 4.3.4 Release of pollutants**
Data / Parameter	Soil Condition
Unit	-
Description	Appropriate disposal of solids waste as required by the Law on Solid Waste Management[36]
Source of data	Assessing disposal methods during site visits and checking solid waste disposal records.
Value(s) applied	Domestic solid wastes will be collected and handled according to the Solid Waste Control Regulation. They will be collected and transferred to the municipality's solid waste storage facility, periodically.
Measurement methods and procedures	Domestic solids wastes will be disposed as required by the Law on Solid Waste Management
Monitoring frequency	At each verification
QA/QC procedures	-
Purpose of data	To monitor the contribution to SDG 12 and Principle 4.3.4.
Additional comment	-

[36] https://www.resmigazete.gov.tr/eskiler/2015/04/20150402-2.htm

Relevant SDG Indicator/Safeguarding Principle	**Principle 4.3.11 Endangered Species**
Data / Parameter	Biodiversity
Unit	-
Description	Ensuring that the project creates no disturbance to the regional habitat
Source of data	Assessments during site visits and ecosystem reports
Value(s) applied	No disturbance to the regional habitat in the baseline scenario
Measurement methods and procedures	Reports
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	To monitor the contribution to Principle 4.3.11.
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	**SDG 8: Decent Work and Economic Growth** - ***8.5.1 Average hourly earnings of female and male employees, by occupation, age and persons with disabilities*** **Principle 3.6.1: Labour Rights**
Data / Parameter	Quantitative employment and income generation
Unit	Number of locally recruited staff and their social security records
Description	Ensuring that the staff receives their full salaries on time.
Source of data	Social Security Records to be provided by the Project Owner
Value(s) applied	The project is expected to create job opportunity for 20 people during construction and 10 people in operation period.
Measurement methods and procedures	The project owner is committed to ensuring that the staff receives their full salaries on time. Number of employees and the evidence for their wages being paid will be checked from the social security records, which will be provided by the Project Owner.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	To monitor the contribution to SDG 8 and Principle 3.6.1.
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	**SG Principle 3.4.3 Cultural Hertiage, Indigenous Peoples, Displacement and Resettlement**
Data / Parameter	Expropriation of the project site
Unit	-
Description	Expropriation to be carried out on the project site
Source of data	Expropriation documents and/or interviews
Value(s) applied	Land acquisition will be done according to the Turkish Expropriation Laws and Electricity Market Law (4628).

Measurement methods and procedures	Some parcels of the project area belong to Treasury while others are the lands owned by individuals.[37]
Monitoring frequency	Once in the first verification
QA/QC procedures	-
Purpose of data	Land acquisition to be done according to the Turkish Expropriation Laws and Electricity Market Law (4628).
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	**SDG13 : Climate Action** ***13.2.1. Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development ,*** **SG Principle 3.4.3 Release of Pollutants**
Data / Parameter	Emissions Reductions in tCO_2
Unit	tCO_2
Description	Reduction of CO_2 emissions due to implementation of project activity
Source of data	Electricity generated by Antalya SPP and calculated combined margin (CM) emission factor will be used as reference in calculation of the emission reduction.
Value(s) applied	Estimated annual emission reduction is 43,760 tonnes of CO_2 The applied OM & BM for the project are: Operating Margin: 0.656 tCO_2/MWh Build Margin: 0.211 tCO_2/MWh Therefore, the applied Combined margin for the project is 0.545 tCO_2/MWh.
Measurement methods and procedures	The net electricity supplied by the Project will be continuously measured and recorded by EPIAS; and will be keot by the Project Owner. In addition to the EPIAS meters which is used for billing purposes, records taken by meters using at project site will be used for comparison.
Monitoring frequency	Once every monitoring period
QA/QC procedures	-
Purpose of data	To calculate the baseline emission value; and also to monitor the contribution to SDG 13 (Take urgent action to combat climate change and its impacts)
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	**SG Principle 4.3.5 Hazardous and Non-hazardous Waste**
Data / Parameter	Other Pollutants
Unit	-
Description	Proper management of waste oil
Source of data	Assessing disposal methods during site visits and checking waste oil disposal records.

[37] Antalya SPP EIA, page 15

Value(s) applied	No waste oil during baseline situation.
Measurement methods and procedures	Waste oil will be disposed in line with regulation # 26952 on control of waste oils.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	To monitor the contribution to Principle 4.3.5.
Additional comment	-

B.7.2. Sampling plan

No sampling plan will be necessary.

B.7.3. Other elements of monitoring plan

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

Net electricity generation will be measured and recorded via meters sealed by TEIAS for billing purposes therefore no new additional protocol will be needed for monitoring emission reduction. Power Plant Manager will be responsible for the electricity generated, gathering all relevant data and keeping the records.

Generation data collected during crediting period will be submitted to GTE 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.

VER Team Members is expected to include the following staff:

Plant Manager: Responsible for running the plant and compliance with VER monitoring plan.
Accounting Manager: Responsible for keeping data about generation and consumption.
GTE: Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

Installation of meter and data monitoring will be carried out according to the regulations by TEIAS. Two metering devices (one of them used as spare) will be used for monitoring the electricity generated by the power plant. Readings will be done using main metering devices and spare metering device will be used for comparison only. Data from metering devices will be recorded by TEIAS monthly (through remote reading). In addition to the two metering devices, generation of the plant can be cross checked from EPIAS web site (https://www.epias.com.tr/) which is accessible using a password provided to electricity generation companies. EPIAS records will be used for emission reduction calculations.

All data will be kept for at least two years after the crediting period for QA/QC purposes.

The calibration and maintenance of the meters will be carried out in line with the by law on Metering and Metering Devices[38].

[38] http://www.mevzuat.adalet.gov.tr/html/21179.html

SECTION C. Duration and crediting period

C.1. Duration of project

C.1.1. Start date of project

Start date of project activity is determined as 16/12/2020 which is the date of PV Module Agreement (as also indicated in the Milestones table).

C.1.2. Expected operational lifetime of project

The operational lifetime of the project is expected about 49 years.

C.2. Crediting period of project

C.2.1. Start date of crediting period

01/01/2021

C.2.2. Total length of crediting period

Crediting period will be valid for 5 years and renewed twice. Thus, total length of crediting period will be 15 years.

SECTION D. Safeguarding principles assessment

D.1. Analysis of social, economic and environmental impacts

Safeguarding principles	Assessment questions	Assessment of relevance to the project (Yes/potentially/no)	Justification	Mitigation measure (if required)
3.1. Human Rights	The project does not respect internationally proclaimed human rights and is not complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights.	No	Turkey has ratified European Convention on Human Right on 10/03/1954[39]. Therefore, the project is not expected to violate the rules regarding human rights.	No mitigation measure is required for this indicator.

[39] https://www.echr.coe.int/Documents/CP_Turkey_ENG.pdf

	The project does not discriminate with regards to participation and inclusion.	No	Turkey has ratified European Convention on Human Right on 10/03/1954. Therefore, the project is not expected to violate the rules regarding human rights.	No mitigation measure is required for this indicator.
3.2. 1 Gender Equality and Women's Rights	Is there a possibility that the project might reduce or put at risk women's access to or control of resources, entitlements and benefits?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment[40].	No mitigation measure is required for this indicator.
	Is there a possibility that the project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	Is there a possibility that the project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities (such as lack of time, child care duties, low	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.

[40] http://www.ilo.org/ankara/areas-of-work/equality-discrimination/lang--tr/index.htm

	literacy or educational levels, or societal discrimination)?			
	Does the project take into account gender roles and the abilities of women or men to benefit from the project's activities (e.g., Does the project criteria ensure that it includes minority groups or landless peoples)?	Yes	The project outputs serve everyone without regarding gender. It provides electricity for all.	No mitigation measure is required for this indicator.
	Does the project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	Would the project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	Would the project potentially limit	No	Turkey has ratified ILO convention	No mitigation measure is

	women's ability to use, develop and protect natural resources, taking into account different roles and priorities of women and men in accessing and managing environmental goods and services?		100, 111, 122 and 142, which provides gender equality and promotes women's employment.	required for this indicator.
	Is there a likelihood that the proposed project would expose women and girls to further risks or hazards?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
3.2.2 Gender Equality and Women's Rights	The project is not directly or indirectly contribute sexual harassment and/or any forms of violence against women – address the multiple risks of gender-based violence, including sexual exploitation or human trafficking.	No	Turkey has ratified European Convention on Human Right on 10/03/1954, which inludes the right to life as well as prohibition of torture, slavery, discrimination and forced labor.	No mitigation measure is required for this indicator.
	The project is not directly or indirectly contribute slavery, imprisonment, physical and mental drudgery, punishment or coercion of women and girls.	No	Turkey has ratified European Convention on Human Right on 10/03/1954, which inludes the right to life as well as prohibition of torture, slavery, discrimination and forced labor.	No mitigation measure is required for this indicator.

	The project is not directly or indirectly contribute restriction of women's rights or access to resources (natural or economic).	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	The project is not directly or indirectly contribute recognise women's ownership rights regardless of marital status – adopt project measures where possible to support to women's access to inherit and own land, homes, and other assets or natural resources.	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
3.2.3 Gender Equality and Women's Rights	Where appropriate for the implementation of the project, paid, volunteer work or community contributions will be organised to provide the conditions for equitable participation of men and women in the identified tasks/activities.	Yes	The project promotes equal participation of man and women. Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality.	No mitigation measure is required for this indicator.
	The project introduces conditions that ensure the participation of women or men in	Yes	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality.	No mitigation measure is required for this indicator.

	project activities and benefits based on pregnancy, maternity/paternity leave, or marital status. The project also ensures that these conditions do not limit the access of women or men, as the case may be, to project participation and benefits.			
3.2.4 Gender Equality and Women's Rights	The project refers to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks.	Yes	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality. It also shows parallelity with national strategies prepared for women employment by creating opportunities for all.	No mitigation measure is required for this indicator.
3.3 Community Health, Safety and Working Conditions	The project avoids community exposure to increased health risks and does not adversely affect the health of the workers and the community.	No	Turkey has ratified ILO convention 155 and about work safety and precautions[41]	Staff will be trained during construction operation phases, such as general HSE, risk, first aid,etc.
3.4.1 Cultural Hertiage,	Does the project area include sites,	No	No sites, structures, or	No mitigation is required for this

[41]https://www.ilo.org/global/standards/subjects-covered-by-international-labour-standards/occupational-safety-and-health/WCMS_356966/lang--en/index.htm

Indigenous Peoples, Displacement and Resettlement	structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g., knowledge, innovations, or practices)?		objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture were observed in the project area.[42]	indicator.
3.4.2 Cultural Hertiage, Indigenous Peoples, Displacement and Resettlement	Does the project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	No	For the project resettlement is not required.	No mitigation is required for this indicator.
3.4.3 Cultural Hertiage, Indigenous Peoples, Displacement and Resettlement	Does the project require any change to land tenure arrangements and/or other rights?	No	Some parcels of the project area belong to Treasury while others are the lands owned by individuals.[43]	Land acquisition will be done according to the Turkish Expropriation Laws and Electricity Market Law (4628).
	For projects involving land-use tenure, are there any uncertainties with regards land tenure, access rights, usage rights or land ownership?	No	Land acquisition will be done according to the Turkish Expropriation Laws and Electricity Market Law (4628). There will be no action until all permissions are taken.	No mitigation is needed for this indicator.
3.4.4 Cultural Hertiage, Indigenous Peoples, Displacement	Are indigenous peoples present in or within the area of influence of the project and/or is the	No	No indigenous people was identified.	No mitigation is required for this indicator.

[42] Antalya SPP EIA, page 59

[43] Antalya SPP EIA, page 15

and Resettlement	project located on land/territory claimed by indigenous peoples?			
3.5. Corruption	The project does not engage in, contribute to or reinforce corruption of any kind.	No	Turkey has ratified several conventions on bribery and corruption including OECD and UN conventions[44]	No mitigation is required for this indicator.
3.6.1 Economic Impacts	The project does not involve and is not complicit in any form of forced or compulsory labour.	No	Turkey has ratified ILO 87 and 98 conventions.	No mitigation is required for this indicator.
	Workers can establish and join labour organisations.	Yes	Turkey has ratified ILO 87 and 98 conventions.	No mitigation is required for this indicator.
	Working agreements with all individual workers are documented and implemented.	Yes	All employee will be recruited according to the national legislations.	No mitigation is required for this indicator.
	The Project Developer justifies that the employment model applied is locally and culturally appropriate.	Yes	All employee will be recruited according to the national legislations.	No mitigation is required for this indicator.
	The project does not employ and is not complicit in any	No	Turkey is a party of IPEC[45],[46] since 1992 and ratified	No mitigation measure is required for this

[44] http://www.masak.gov.tr/en/LaunderingProceedsofCrime/Chronology.htm

[45] http://www.ilo.org/ipec/programme/lang--en/index.htm

[46] http://www.ilo.org/ipec/Regionsandcountries/lang--en/index.htm

	form of child labour.		ILO convention 138 and 182[47].	indicator.
	The Project Developer ensures the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures.	Yes	Turkey has ratified ILO convention 155 and about work safety and precautions.	Staff will be trained during construction operation phases, such as general HSE, risk, first aid,etc.
3.6.2 Economic Impacts	The Project Developer demonstrates the financial sustainability of the project, also including those that will occur beyond the Project Certification period.	Yes	The investment is capital intensive but operating as low cost plant. The costs are very low compared to thermal power generation technologies. VER revenues help in shorter return periods for investment. After certification period, depreciation costs are recovered and cost of operating plant will be less costly.	No mitigation needed for this indicator.
	The project considers economic impacts and demonstrate a consideration of potential risks to the local economy	Yes	The project involved electricity generation from local and renewable sources. Since Turkey is dependent on	No mitigation is needed for this indicator.

[47] http://www.ilo.org/public/turkish/region/eurpro/ankara/about/sozlesmeler.htm

	and how these have been taken into account in project design, implementation, operation and after the project.		import fuel (mainly natural gas and coal), project will not generate any risk but contribute to local economy.	
4.1.1 Climate and Energy	Will the project increase greenhouse gas emissions over the baseline scenario?	No	Since it is a solar energy power plant, the project is expected to have a positive impact on Climate Change by eliminating fossil fuels.	No mitigation measure is required for this indicator.
4.1.2 Climate and Energy	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	Project does not use any local fuel resource. It is connected to the national grid and supply 46,736,532 kWh additional energy to the grid.	No mitigation measure is required for this indicator.
4.2.1 Climate and Energy	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 does not have any expected effects on the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s).	No mitigation measure is required for this indicator.
4.2.2 Climate and Energy	Could the project directly or indirectly	Potentially	The project may increase the risk of	Erosion control will be set by

	cause additional erosion and/or water body instability or disrupt the natural pattern of erosion?		erosion due to scraping of topsoil.	intensifying local characteristics.[48] Topsiol will be separated and used in landscaping. [49]
4.3.1 Climate and Energy	Does the project involve the use of land and soil for production of crops or other products?	Yes	Some parts of the project is agricultural land owned by individuals.[38]	Required permissions will be taken from relevant ministries.
4.3.2 Climate and Energy	Will the project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	Possible	Akseki distrcit and the project site are in the 3rd Degree Seismic Zone according to the earthquake zones determined by the General Directorate of Disaster Affairs.	All the design and construction works will be performed in accordance with relevant regulation (Regulation on Buildings Constucted in Earthquake Zones.).[50]
4.3.3 Climate and Energy	Could the project be negatively impacted by the use of genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development)?	No	The project activity is not relevant to the use of genetically modified organisms or GMOs since it is a renewable energy power plant.	No mitigation measure is required for this indicator.
4.3.4 Climate and Energy	Could the project potentially result in the release of pollutants to the environment?	Yes	Solis waste, waste oil and domestic wastewater generation are expected during both construction and operation.	Domestic solid wastes will be collected and handled according to the Solid Waste Control Regulation. They

[48] Antalya SPP EIA, page 97

[49] Antalya SPP EIA, page 83

[50] Antalya SPP EIA, page 44

				will be collected and transferred to the municipality's solid waste storage facility, periodically. Domestic wastewater generated will be collected in a cesspool and then conveyed to the closest ww treatment system. Waste oil will be collected and disposed according to the Regulation on Waste Oil Control. [51]
4.3.5 Climate and Energy	Will the project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	Yes	Project is expected to create solid, and liquid wastes during its construction.	Handling, storage and disposal of these wastes will be done according to the Turkish regulations.
4.3.6 Climate and Energy	Will the project involve the application of pesticides and/or fertilisers?	No	The project is not relevant since it is a renewable energy project.	No mitigation is needen for this indicator.
4.3.7 Climate and Energy	Will the project involve the harvesting of forests?	No	The closest forestry area is 400 m distant from the project ara.[52]	No mitigation is needen for this indicator.
4.3.8 Climate and Energy	Does the project modify the quantity or nutritional quality of food	No	The project is not relevant since it is a renewable energy project.	No mitigation is needen for this indicator

[51] Antalya SPP EIA, page 91-92-96

[52] Antalya SPP EIA, page 98

	available such as through crop regime alteration or export or economic incentives?			
4.3.9 Climate and Energy	Will the project involve animal husbandry?	No	The project is not relevant since it is a renewable energy project.	No mitigation is needen for this indicator.
4.3.10 Climate and Energy	Does the project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites[11] identified?	No	There are no national parks, natural parks, natural protection areas, wildlife protection areas as declared in accordance with the Turkish national legislation.	No mitigation is needen for this indicator.
4.3.11 Climate and Energy	Are there any endangered species identified as potentially being present within the project boundary (including those that may route through the area)?	No	No endemic, endangered and or threatened flora and fauna species were identified in the project site and its vicinity. [53]	No mitigation is needen for this indicator.
	Does the project potentially impact other areas where endangered species may be present through transboundary affects?	No	No endemic, endangered and or threatened flora and fauna species were identified in the project site and its vicinity.[48]	No mitigation is needen for this indicator.

SECTION E. Local stakeholder consultation

[53] Antalya SPP EIA, page 61

EIA Stakeholder Meeting took place on 09/02/2017 at Toros Dinlenme Tesisleri in Akseki, in city of Antalya. Participants were among;

- Directorate General of Environmental Impact Asssessment, Permit and Inspection,
- Antalya Provincial Directorate of Environment and Urbanisation
- Gün Güneş Enerjisi Elektrik Üretim San. Tic. A.Ş.,
- Almer Proje Ltd. Şti.,
- Village mukhtars and
- Local people.

A presentation was given to the participants on the solar power plant and the planned actions. Participants' questions were answered by Almer Proje Ltd. Şti. ve Gün Güneş Enerjisi Elektrik Üretim San. Tic. A.Ş. representatives and the procedures to be followed were explained in detail.[54]

E.1. Solicitation of comments from stakeholders

Not applicable yet.

E.2. Summary of comments received

Not applicable yet.

E.3. Report on consideration of comments received

Not applicable yet.

[54] Antalya SPP EIA, page 116

Appendix 1. Contact information of project participants

Organization name	Gün Güneş Enerjisi Elektrik Üretim Sanayi ve Ticaret A.Ş
Registration number with relevant authority	-
Street/P.O. Box	İkitelli Organize Sanayi Bölgesi Ziya Gökalp Mah. Atatürk Bulvarı 8. Cadde No:3 Başakşehir
Building	-
City	İstanbul
State/Region	-
Postcode	-
Country	Turkey
Telephone	+90 212 267 4206
Fax	+90 212 267 4209
E-mail	-
Website	http://www.boydakenerji.com.tr/
Contact person	
Title	Project manager
Salutation	Mr.
Last name	Beyla
Middle name	-
First name	Alpay
Department	Management
Mobile	-
Direct fax	-
Direct tel.	+90 212 267 4206
Personal e-mail	alpay.beyla@boydakenerji.com

Organization name	GTE
Street/P.O. Box	Mustafa Kemal Mah 12118. Cad. No:4
Building	C/42
City	Ankara
State/Region	-
Postcode	06510
Country	Turkey
Telephone	+90 312 514 63 63
Fax	-
E-mail	kemal@gte.com.tr
Website	www.gte.com .tr
Contact person	Mehmet Kemal Demirkol
Title	Director
Salutation	Mr.
Last name	Demirkol
Middle name	Kemal

First name	Mehmet
Department	Management
Mobile	-
Direct fax	-
Direct tel.	+90 312 514 63 63
Personal e-mail	kemal@gte.com.tr

Appendix 2. Summary of post registration design changes

Revision History

Version	Date	Remarks
1.1	24 August 2017	Updated to include section A.8 on 'gender sensitive' requirements
1	10 July 2017	Initial adoption