GEZIN SOLAR POWER PROJECT

Document Prepared By Life Enerji

Contact Information

Project Title	Gezin Solar Power Project (Gezin SPP)
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Prepared By	Life İklim ve Enerji Ltd. Şti.
Contact	Oğuzlar Mah. 1377 Sk. No:19/9 Balgat, Çankaya/Ankara e-mail: info@lifeenerji.com phone: +90 312 481 21 42 fax: +90 312 480 88 10

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Lahit Elektrik Üretim A.Ş. (hereafter referred to as "Lahit"), Petrojes Elektrik Üretim A.Ş. and Solarges Elektrik Üretim A.Ş. invested into a new Solar Power Project called Gezin Solar Power Project (hereafter referred to as the "Project" or "Gezin SPP"). Gezin SPP involves installation and operation of 4 unlicensed (GEZİN 3, GEZİN 4, GEZİN 5 and Solarges) solar power projects. Lahit is the bundling agency of this project. The project site is located in Maden district of Küçükova village, in Elazığ province of Turkey. The total capacity of the project is **3.83 MWe**[1]. The generated energy is fed into Gezin Distribution Center which is connected to the grid through Hazar-1 Substation.[2]

An estimated net electricity generation of 6963[3] MWh per year by the efficient utilization of the available solar energy by project activity replace the grid electricity, which is constituted of different fuel sources, mainly fossil fuels. The electricity produced by project activity results in a total emission reduction of **3,952 tonnes of CO2e/year**. The total emission reduction by the project activity is estimated to be **39,520 tonnes of CO2e** for the first crediting period, which is 15/01/2018 to 14/01/2028. Moreover, project activity contributes further dissemination of solar energy and extension of national power generation. Usage of distribution system agreement of GEZİN 3, GEZİN 4 and GEZİN 5 took place on 15/01/2018[4] and commercial generation started on 15/01/2018. On 12/01/2018, provisional acceptance of GEZİN 3-4-5 took place[5]; however, even if projects were able to generate electricity, they were not be able to use the distribution system. Thus, they could not sell the electricity they produce until 15/01/2018. Furthermore, the provisional acceptance date of Solarges is on 11/06/2019. And the distribution system agreement of Solarges is on 18/06/2019. In this sense, ~~first crediting period started on 15/01/2018. GEZİN 3, GEZİN 4 and GEZİN 5 came into operation and Solarges has the necessary permissions and is under project development phase.~~the start date of the first crediting period has been accepted as 15/01/2018.

Section 1.11 lists the laws and Regulation that a renewable energy plant should comply. Gezin SPP is an unlicenced renwable energy plant. Thus, it should have call letter and connection to distribution system agreement. These two are issued for Gezin 3, Gezin 4, Gezin 5 and Solarges. Environment Law is also satisfied and it has been confirmed by Ministry of Environment that Gezin SPP is exempted from Environmental Impact Assessment Regulation. Lastly, the project complies to the Occupational Health and Safety Regulation by paying the insurance premium (SGK). As in Turkey, these are the main laws and Regulations that should be complied for renewable energy plants.

The technology being employed, converts solar energy into electrical energy. The technology is an environment friendly technology since there are no GHG emissions associated with the electricity generation. The proposed PV project use crystalline silicon based solar PV modules.

Since the project activity is a Greenfield installation, there was no electricity generation at the project site prior to its implementation. In this sense, the project helps Turkey to stimulate and commercialize the use of grid connected renewable energy technologies and markets. Furthermore, the project demonstrates the viability of grid connected solar farms which can support improved energy security, improved air

[1] Please see Connection to Distribution System Agreements of GEZİN 3, GEZİN 4 and GEZİN 5 and Solarges.

[2] Please see Connection to Distribution System Agreements of GEZİN 3, GEZİN 4 and GEZİN 5.

[3] Please see monthly electrical generation information of the plants and ER Calculation Excel.

[4] Please see Usage of Distribution System Agreements of GEZİN 3, GEZİN 4 and GEZİN 5.

[5] Please see: Provisional acceptance documents of GEZİN 3, GEZİN 4 and GEZİN 5

quality, alternative sustainable energy futures, improved local livelihoods and sustainable renewable energy industry development. The specific goals of the project are to:

- Reduce greenhouse gas emissions in Turkey compared to the business-as-usual scenario,
- Help to stimulate the growth of the solar power industry in Turkey,
- Create local employment during the construction and the operation phase of the solar plant,
- Reduce other pollutants resulting from power generation industry in Turkey, compared to a business-as-usual scenario,
- Help to reduce Turkey's increasing energy deficit, and differentiate the electricity generation mix and reduce import dependency.

As the project developer, Lahit believes that efficient utilization of all kinds of natural resources with a harmony coupled with responsible environmental considerations is vital for sustainable development of Turkey and the world. This has been a guiding factor for the shareholders towards the concept of designation and installation of a solar power project. Other than the objective of climate change mitigation through significant reduction in greenhouse gas (GHG) emissions, the project has been carried out to provide social and economic contribution to the region in a sustainable way.

Lastly, as discussed under Section 5.3, head of village (Muhtar) will be the main contact person between the project owner and the local stakeholders. Muhtar will make sure that there's continuous communication between the two parties. As validated during the site visit, muhtar (head of the village) had already taken the contact information of Company Executive of the company so that the local stakeholders will be able to reach company executive whenever they have any complaints, suggestions or ideas about the project.[6]

1.2 Sectoral Scope and Project Type

Gezin SPP is classified in the Renewable Energy Source category as electricity from non-fossil and non-depletable energy sources, in this case from solar, is fed into the Turkish electricity grid.

This is not a grouped project activity. The project activity is a bundle of ~~3~~ 4 project participants. GEZİN 3 and GEZİN 5 are contained within Petrojes Elektrik Üretim A.Ş. and GEZİN 4 is contained within Lahit Elektrik Üretim A.Ş. Lastly, Solarges is contained within Solarges Elektrik Üretim A.Ş.

- The project applies methodology AMS I.D., which is an approved methodology under VCS.
- The project is micro-scale solar project which is an eligible project type.
- The project activity results in displacement of electricity from thermal power plants while contributing to sustainable development of Turkey.
- This project activity is not associated with geo-engineering or energy generated from fossil fuel or nuclear, fossil fuel switch, nor does it enhances or prolongs such energy generation.

1.3 Project Proponent

The project participant **"Lahit"** is the legal owner of the project and has the legal rights for the credits.

Organization name	Lahit Elektrik Üretim A.Ş.

[6] Please see the muhtar's signed declaration on contact information.

Contact person	Ramazan Aslan
Title	Company Executive
Address	Oğuzlar Mah. 1377 Sk. No: 19/9 Balgat, Çankaya/Ankara, Turkey
Telephone	+90 312 481 2142/19
Email	ramazan.aslan@lifeenerji.com

1.4 Other Entities Involved in the Project

Organization name	Life İklim ve Enerji Ltd. Şti.
Role in the project	Project Consultant
Contact person	~~Kerem Ziya Akdemir~~İklim Şahin
Title	~~Assistant Expert~~Carbon Deputy Director
Address	Oğuzlar Mah. 1377 Sk. No: 19/9 Balgat, Çankaya/Ankara, Turkey
Telephone	+90 312 481 2142
Email	~~kerem.akdemir~~iklim.sahin@lifeenerji.com

1.5 Project Start Date

Usage of distribution system agreement of GEZİN 3, GEZİN 4 and GEZİN 5 took place on 15/01/2018[7] and commercial generation started on 15/01/2018. On 12/01/2018, provisional acceptance of GEZİN 3-4-5 took place[8]; however, even if projects were able to generate electricity, they were not be able to use the distribution system. Thus, they could not sell the electricity they produce until 15/01/2018. Furthermore, the provisional acceptance date of Solarges is on 11/06/2019. And the distribution system agreement of Solarges is on 18/06/2019. In this sense, the start date of the first crediting period has been accepted as 15/01/2018.

~~Usage of distribution system agreement of GEZİN 3, GEZİN 4 and GEZİN 5 took place on 15/01/2018 and commercial generation started on 15/01/2018. On 12/01/2018, provisional acceptance of GEZİN 3-4-5 took place; however, even if projects were able to generate electricity, they were not be able to use the distribution system. Thus, they could not sell the electricity they produce until 15/01/2018. In this sense, project start date is 15/01/2018.~~

1.6 Project Crediting Period

A two times renewable crediting period of 10 years 0 month shall apply. Crediting period is between 15/01/2018 and 14/01/2028.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	x

[7] Please see Usage of Distribution System Agreements of GEZİN 3, GEZİN 4 and GEZİN 5.

[8] Please see: Provisional acceptance documents of GEZİN 3, GEZİN 4 and GEZİN 5

Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
15/01/2018-31/12/2018	3,800
2019	3,952
2020	3,952
2021	3,952
2022	3,952
2023	3,952
2024	3,952
2025	3,952
2026	3,952
2027	3,952
01/01/2028-14/01/2028	152
Total estimated ERs	**39,520**
Total number of crediting years	10
Average annual ERs	3,952

1.8 Description of the Project Activity

The technology being employed, converts solar energy into electrical energy. The technology is an environment friendly technology since there are no GHG emissions associated with the electricity generation.

The proposed PV project use crystalline silicon based solar PV modules. Since the project activity is a Greenfield installation, there was no electricity generation at the project site prior to its implementation. Technical specifications of typical modules are as follows:

Technical detail of the equipment of Gezin 3, Gezin 4 and Gezin 5				
				Remark
The Project	*Gezin 3*	*Gezin 4*	*Gezin 5*	*Solarges*
Type of system	*Grid-connected Photovoltaic (PV) Power Plant*			
Type of PV modules	*CSUN270-60P Polycrystalline PV Modules*			
	Polycrystalline silicon			
Number of modules	*4334*	*4312*	*4312*	*3630*
Total capacity of modules	*1170,18 kWp*	*1164,24 kWp*	*1164,24 kWp*	*275 Wp*
Module supplier	*CSUN*	*SCHMID*	*PEKINTAS (SUNSOLAR)*	
Inverter capacity	*50kW but 1 invertor is set to 35 kW**		*60 Kw*	
Number of inverters	*20*	*15*		
Inverter type	*KACO blueplanet 50.0 TL3 M1*	*STP 60-10*		
Module guarantee	*10 years of physical resistance*			
25 years of performance guarantee				
Inverter guarantee	*At least 5 years product guarantee*			

Technical plant and installation equipment of Gezin 3, Gezin 4 and Gezin 5		Remark	
The Project	Gezin 3	Gezin 4	Gezin 5
Type of system	Grid-connected Photovoltaic (PV) Power Plant		
Type of PV modules	CSUN270-60P Polycrystalline PV Modules		
Number of modules	4334	4312	4312
Total capacity of modules	1170,18 kWp	1164,24 kWp	1164,24 kWp
Module supplier	CSUN		
Inverter capacity	50kW but 1 invertor is set to 35 kW*		
Number of inverters	20		
Inverter type	KACO blueplanet 50.0 TL3 M1		
Module guarantee			

Table 1: *Technical specifications*[9]

[9] Please see: Provisional acceptance documents of GEZİN 3, GEZİN 4 and GEZİN 5 and PV module and inverter brochures

* To not exceed the installed capacity, an inverter in each power plant was set to 35 KW.

~~25 years of performance guarantee~~	~~At least 5 years product guarantee~~
~~Inverter guarantee~~	

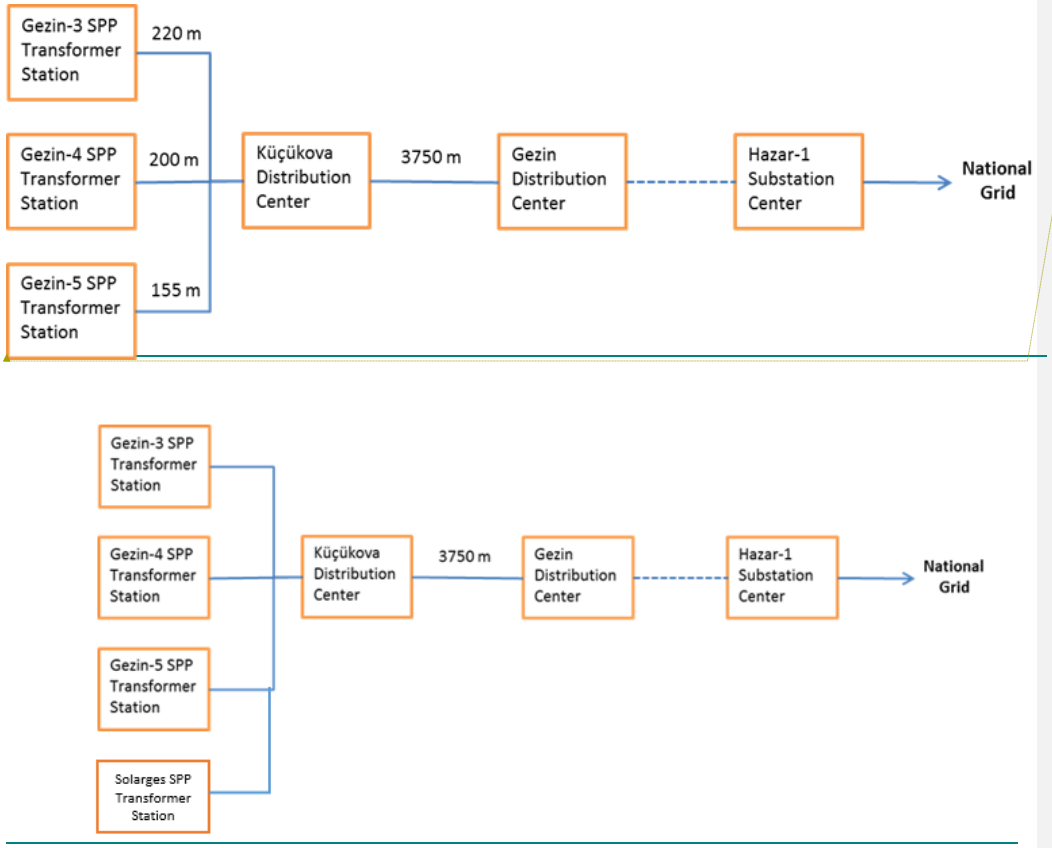

Figure 1: *Electrical single-line diagram*

Technical life time of Lahit is determined by using the "Tool to determine the remaining lifetime of equipment" (v. 1)[10] . In the tool it is stated that;

Project participants may use one of the following options to determine the remaining lifetime of the equipment:

(a) Use manufacturer's information on the technical lifetime of equipment and compare to the date of first commissioning;
(b) Obtain an expert evaluation;
(c) Use default values.

For the project option (a) is used. According to the equipment agreement, the system has 25 years of 80.7% performance warranty.[11]

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

[11] Please see: EPC Agreement and PV module and inverter brochures.

The project activity achieve emission reductions by avoiding CO2 emissions from the business-as-usual scenario electricity generation produced by mainly fossil fuel-fired power plants within the Turkish national grid (**Figure 2**). Total emission reduction over the 10 year crediting period is expected to reach **39,520 tCO2e** with the assumed total net electricity generation of **6,963 MWh** per year (for details see B.2.)

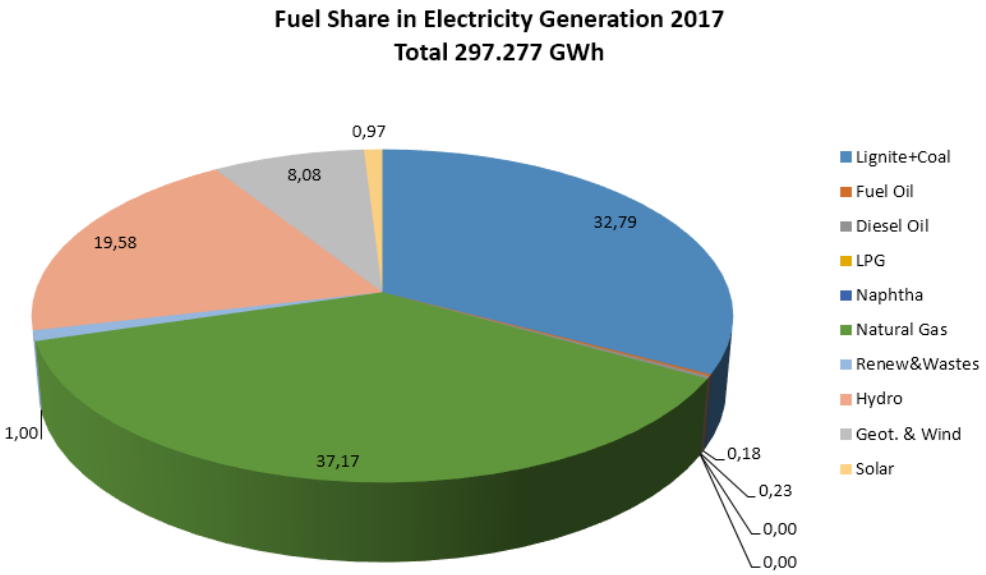

Figure 2: *Share of Sources in Installed Capacity 2017*[12]

[12] Please see: http://www.teias.gov.tr/sites/default/files/2018-10/59%282000-2017%29.xls

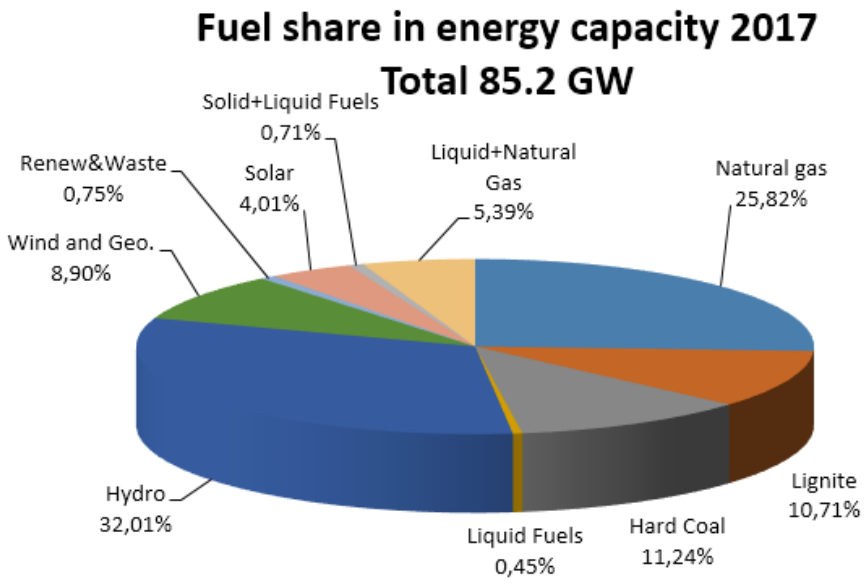

Figure 3: *Share of Sources in Electricity Generation 2017*[13]

The emission reductions would not occur in the absence of the proposed project activity because of various real and perceived risks that impede the provision of financing. Gezin SPP, as a micro-scale solar power plant project, will serve as a perfect project to demonstrate long-term potential of solar energy as a means to efficiently reducing GHG emissions as well as to diversifying and increasing security of the local energy supply and contributing to a sustainable development.

Generation of emission reduction and by the way crediting period started with the first day of documented electricity supply to the national grid. The first 10-year crediting period is from 15/01/2018 to 14/01/2028 after the completion of commissioning. Applying the approved methodology to the project (detailed in the Section B) annual average amount of 3,952 tCO2e emission reductions is estimated to be achieved by producing 6,963 MWh/year electricity. In each year the amount of VERs actually generated by the project will vary depending on the metered net electricity supplied to the grid, but totally 39,520 tCO2e emission reductions is expected over the period of 10 years.

1.9 Project Location

The project site is located in Maden district of Küçükova village, in Elazığ province of Turkey. The closest village is Küçükova village. The closest settlement is 1,130 m away from the top view.[14] Geographical coordinates of the project site is given in **Table 2**.

Location of the project is given below in **Figure 4** and **Figure 5**.

[13] Please see: http://www.teias.gov.tr/sites/default/files/2018-10/9.xls

[14] Google Earth Software was used.

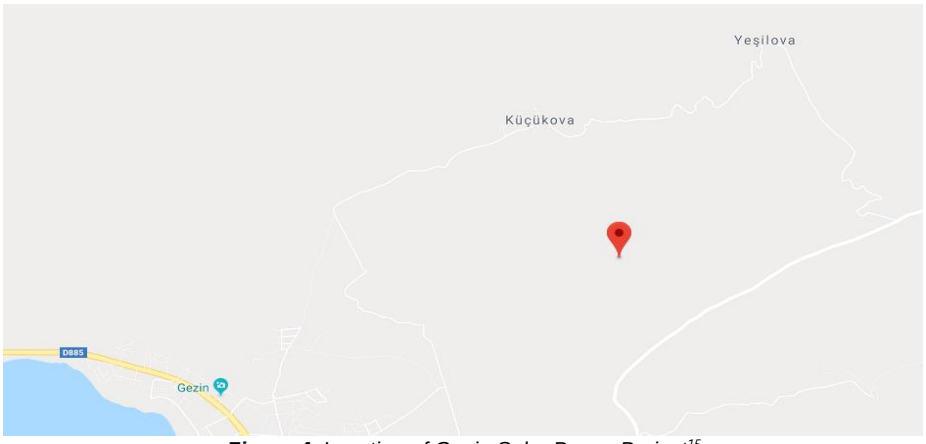

***Figure 4**: Location of Gezin Solar Power Project*[15]

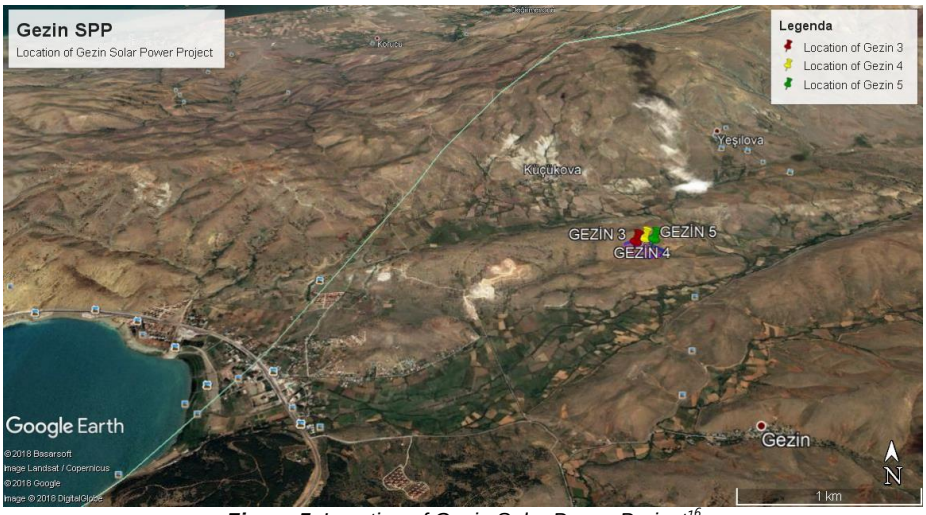

***Figure 5**: Location of Gezin Solar Power Project*[16]

***Table 2**: Geographical coordinates of the project activity*[17]

[15] Google Maps Software was used. https://www.google.com.tr/maps/place/38%C2%B031'54.5%22N+39%C2%B032'56.9%22E/@38.5315595,39.5437106,14.5z/data=!4m5!3m4!1s0x0:0x0!8m2!3d38.5317944!4d39.549125?hl=pt-PT

[16] Google Earth Software was used.

Corner Number of the Plant	Latitude (N)	Longitude (E)
GEZİN 3		
K1	38º 31’ 57.3708’’	39º 32’ 51.5027’’
K2	38º 31’ 58.2852’’	39º 32’ 51.7527’’
K3	38º 31’ 58.8216’’	39º 32’ 51.9272’’
K4	38º 31’ 59.0196’’	39º 32’ 51.8946’’
K5	38º 31’ 59.5056’’	39º 32’ 51.8158’’
K6	38º 31’ 59.9736’’	39º 32’ 51.8816’’
K7	38º 32’ 00.1140’’	39º 32’ 51.8739’’
K8	38º 32’ 01.2660’’	39º 32’ 51.9450’’
K9	38º 32’ 01.7628’’	39º 32’ 53.1402’’
K10	38º 32’ 02.2560’’	39º 32’ 54.1220’’
K11	38º 32’ 00.6216’’	39º 32’ 55.5139’’
K12	38º 31’ 59.0556’’	39º 32’ 57.3363’’
K13	38º 31’ 57.3456’’	39º 32’ 59.1667’’
K14	38º 31’ 57.3492’’	39º 32’ 58.3217’’
GEZİN 4		
K1	38º 32’ 02.2632’’	39º 32’ 54.1324’’
K2	38º 32’ 02.6916’’	39º 32’ 56.4855’’
K3	38º 32’ 03.5052’’	39º 32’ 58.2243’’
K4	38º 32’ 03.9948’’	39º 32’ 59.5120’’
K5	38º 32’ 03.3468’’	39º 33’ 00.1368’’
K6	38º 32’ 02.1696’’	39º 33’ 00.7175’’
K7	38º 32’ 00.6684’’	39º 32’ 57.8645’’
K8	38º 32’ 00.2940’’	39º 32’ 58.1895’’
K9	38º 31’ 59.3184’’	39º 32’ 59.3529’’
K10	38º 31’ 58.0152’’	39º 33’ 00.6714’’
K11	38º 31’ 56.9424’’	39º 33’ 02.4266’’
K12	38º 31’ 56.3448’’	39º 33’ 00.2553’’
K13	38º 31’ 57.3456’’	39º 32’ 59.1829’’
K14	38º 31’ 59.0628’’	39º 32’ 57.3456’’
K15	38º 32’ 00.6252’’	39º 32’ 55.5237’’
GEZİN 5		
K1	38º 32’ 00.6648’’	39º 32’ 57.8818’’
K2	38º 32’ 02.1624’’	39º 33’ 00.7220’’
K3	38º 32’ 01.1328’’	39º 33’ 01.7995’’
K4	38º 31’ 58.4544’’	39º 33’ 06.2204’’
K5	38º 31’ 57.9036’’	39º 33’ 06.2273’’
K6	38º 31’ 57.8712’’	39º 33’ 06.4395’’
K7	38º 31’ 57.7200’’	39º 33’ 06.5667’’
K8	38º 31’ 56.7768’’	39º 33’ 02.7171’’
K9	38º 31’ 56.9460’’	39º 33’ 02.4406’’
K10	38º 31’ 58.0224’’	39º 33’ 00.6802’’
K11	38º 31’ 59.3256’’	39º 32’ 59.3623’’
K12	38º 32’ 00.3012’’	39º 32’ 58.1992’’
SOLARGES		
K1	38º 31’ 57.3708’’	39º 32’ 51.5027’’
K2	38º 31’ 57.3492’’	39º 32’ 58.3217’’
K3	38º 31’ 56.8920’’	39º 32’ 58.3505’’
K4	38º 31’ 56.8884’’	39º 32’ 59.2943’’

[17] Please see Technical Assessment Reports for the coordinates and http://www.rcn.montana.edu/Resources/Converter.aspx for the conversion.

K5	38º 31' 56.0784''	39º 33' 00.1625''
K6	38º 31' 56.6904''	39º 33' 02.3876''
K7	38º 31' 56.3880''	39º 33' 02.9315''
K8	38º 31' 55.9092''	39º 33' 02.7992''
K9	38º 31' 52.7988''	39º 33' 02.5574''
K10	38º 31' 52.8060''	39º 33' 01.2849''
K11	38º 31' 54.7932''	39º 33' 00.5817''
K12	38º 31' 55.7508''	39º 33' 00.2636''
K13	38º 31' 55.6104''	39º 32' 59.0844''
K14	38º 31' 55.9488''	39º 32' 57.7892''
K15	38º 31' 55.9812''	39º 32' 56.3804''
K16	38º 31' 55.7616''	39º 32' 54.9905''
K17	38º 31' 55.5168''	39º 32' 53.6271''
K18	38º 31' 55.4016''	39º 32' 52.5720''
K19	38º 31' 55.7148''	39º 32' 52.4068''
K20	38º 31' 56.1720''	39º 32' 51.9382''
K21	38º 31' 57.1548''	39º 32' 51.4430''

1.10 Conditions Prior to Project Initiation

The pre-project scenario is same as baseline scenario. Please refer Section 2.4 (Baseline Scenario) for the description of baseline scenario.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

Laws as relevant to the project are (Law No. and Enactment Date):

(1) Electricity Market Law[18]

(2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[19]

(3) Environment Law[20]

(4) Occupational Health and Safety Regulation[21] (Nr. 6331, 30.06.2012)

1.12 Ownership and Other Programs

1.12.1 Project Ownership

The project participant **"Lahit"** is the legal owner of the project and has the legal rights for the credits.

1.12.2 Emissions Trading Programs and Other Binding Limits

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

1.12.3 Other Forms of Environmental Credit

The project has not created any form of other credit. Lahit Enerji A.Ş. does not obtain any public funding.

[18] See: https://www.epdk.org.tr/Detay/Icerik/23-2-3/mevzuat (Enactment Date:2013)

[19] See: https://www.epdk.org.tr/Detay/Icerik/23-2-3/mevzuat (Enactment Date: 2005)

[20] See http://www.mevzuat.gov.tr/MevzuatMetin/1.5.2872.pdf (Enactment Date: 1983)

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

1.12.4 Participation under Other GHG Programs

The project does not participate/has not participated under any other GHG program.

1.12.5 Projects Rejected by Other GHG Programs

Gezin Solar Power Project, has not applied for crediting under any other GHG program nor has it been rejected from any other GHG program.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

"Gezin SPP" is classified in the Renewable Energy Source category as electricity from non-fossil and non-depletable energy sources, in this case from solar, is fed into the Turkish electricity grid.

Leakage Management

Not applicable.

Commercially Sensitive Information

Not applicable.

~~Any commercially sensitive information that has been excluded from the public version of the VCS PD that will be displayed on the VCS Project Database shall be listed by the project proponent.~~

Sustainable Development

Economic well-being:

- The project activity generates employment in the local areas.
- The project activity leads to investment to a developing regions which otherwise would not have happened in the absence of project activity. The generated electricity is fed into grid, thereby improving the grid frequency and availability of electricity which provides new opportunities for industries and economic activities for greater local employment and development. The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.
- The project contributes to the economic sustainability around the plant sites, which is promotion of decentralization of economic power.

Social well-being:

- The plant sites are isolated rural areas which are the victims of unemployment, poverty and other social backwardness. The project would lead to the development of these regions.
- The proposed project would enhance availability of power to the local industries, agriculture and commercial activities in the vicinity of the project area by augmenting power supply to the national grid, thereby improving quality of power supplied to various users by stabilizing the grid.
- During civil works, a lot of construction work took place, which generated employment for local people around the plant site.

- Other than these, there are various kinds of mechanical work, which would generate employment opportunity on regular and permanent basis.

- Frequency of visits by skilled, technical personnel and industrialists will increase due to installation / site visit / operation and maintenance work related to solar projects. This directly and indirectly positively effects the social behaviour and economy of villages as well as nearby area.

Environmental well-being:

- The Solar power is one of the cleanest renewable energy powers and does not involve any fossil fuel. There are no GHG emissions.

- There is no impact on land, water, air and soil due to the installation of solar projects. Thus, the project activity contributes to environmental well-being without causing any negative impact on the surrounding environment.

- Use of renewable energy source (solar power) also helps in conservation of natural resources in the country. Thus, less GHG emissions are emitted to the atmosphere.

Technological well-being:

- The project activity is step forward in harnessing the untapped solar potential and further diffusion of the technology in the region.

- The project activity leads to the promotion of solar projects and demonstrates the success of this technology in the region which further motivate more investors to invest in solar power projects. Similarly, the project helps in promoting more and more solar power projects. Hence, the project activity leads to technological well-being.

Further Information

Not applicable.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

Title: Grid Connected Renewable Electricity Generation

Reference: AMS I.D. (Version 18)

It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC website. The approved methodology also refers to latest approved versions of "Tool to calculate the emission factor for an electricity system, version 07.0." for determination of baseline scenario of the proposed project activity.

2.2 Applicability of Methodology

Since the project is below 15 MW installed capacity, small scale methodology AMS I.D. version 18 is used. The applicability criteria are described as follows;

Applicability Criteria	Applicability to the project

Applicability Criteria	Applicability to the project
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass a) supplying electricity to a national or a regional grid; or b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project is renewable energy generation through installation of solar photovoltaic modules. The project will supply electricity to the national grid, sale to grid as well as third party. Thus, the project activity complies with this criterion.
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A2) applies is included in Table 1[22]	The 1st and 3rd option of Table 1 of AMS I.D. Version 18 is applicable (please refer footnote 15)
3. This methodology is applicable to project activities that (a) Install a Greenfield plant; b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	This methodology is applicable to the project activity as, it's an Greenfield project where Option (a) i.e. install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant) . Hence the project activity fulfils the applicable criterion.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: -The project activity is implemented in an existing reservoir with no change in the volume of reservoir; -The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2; -The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.	The Project activity is not a Hydro Power Project, therefore this eligibility criterion is not applicable to the proposed project activity.

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	Project type	AMS-I.A	AMS-I.D	AMS-I.F
1	Project supplies electricity to a national/regional grid	n.a.	√	n.a.
2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)	n.a.	n.a.	√
3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)	n.a.	√	n.a.
4	Project supplies electricity to a mini grid3 system where in the baseline all generators use exclusively fuel oil and/or diesel fuel	n.a.	n.a.	√
5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√	n.a.	n.a.

Applicability Criteria	Applicability to the project
5. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project activity has only renewable component, i.e., solar PV generated power with 3.83 MW capacity, which meets the eligibility of 15 MW for a small scale CDM project activity. The capacity of the project shall remain the same for the entire crediting period. Further, the project does not involve any use of fossil fuel. Thus, this criterion is not applicable to the project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The project activity generates only power and hence is not a cogeneration system. Thus, this criterion is not applicable to the project activity.
7. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The project activity is the new installation of solar PV generated power project and doesn't involve the addition of new unit to any of existing renewable power generation facility therefore the given criterion is not applicable to the project activity.
8. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	Not applicable, project activity is neither retrofit nor modification of existing facility. The installed capacity of the project will be 3.83 MW, which is not exceeding the limit for small scale projects. The entire project is a Green field project activity and not the enhancement or up gradation project.
9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	Not applicable as the project activity is neither a landfill gas, waste gas, wastewater treatment and agro-industries projects, nor a recovered methane emissions project.
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	Not applicable as the project is not a biomass project.

2.3 Project Boundary

The project spatial extend of Gezin SPP is the project power plant and all power plants connected physically to the electricity system which is discussed and applied with calculation of combined margin in accordance of "Tool to calculate the emission factor for an electricity system".

Project boundary diagram is depicted in the diagram below:

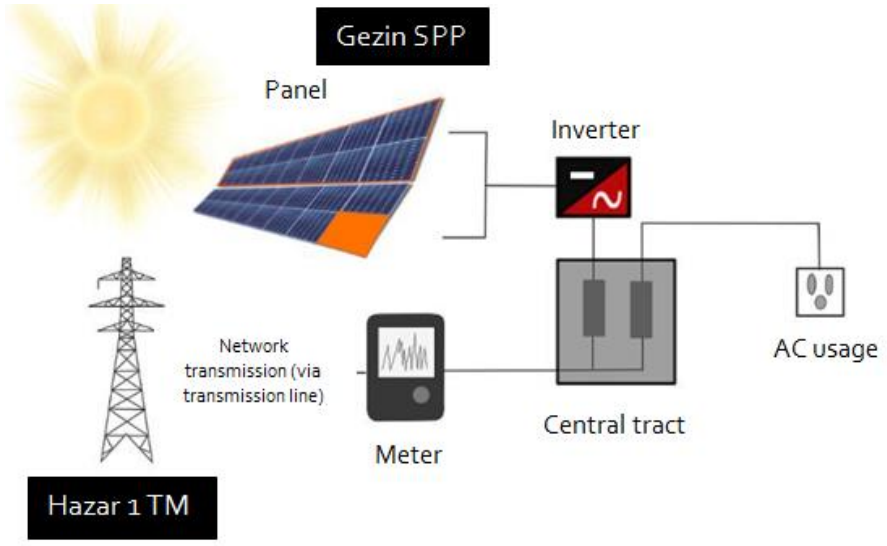

Figure 6: *Project boundary diagram*

For the purpose of GHG mitigation/sequestration following table shall be completed.

Table 3: Emissions sources included in or excluded from the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline Scenario	Grid	CO_2	Yes	*Main emission source*: Fossil fuels fired for electricity generation cause CO_2 emissions. It is included to baseline calculation to find the displaced amount by the project activity.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
		Other	No	The project activity does not emit any other emissions.
Project Scenario	No emissions	CO_2	No	Minor emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	The project activity does not emit any other emissions

2.4 Baseline Scenario

According to the guidelines of the applicable approved methodology AMS.I.D (Version 18), "The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources

into the grid." Thus, proposed project activity evacuate power to the National Grid complying with the stated guideline.

To describe the baseline and its development for the project activity, long-term electricity demand and supply projections for Turkey are assessed.

When **Table 4** and **Figure 7** are examined, electricity demand is expected to exceed 420 billion kWh in 2027 with an average increase of 3.9%[23] for the low scenario, for the baseline scenario, electricity demand is expected to increase by 4.6% on average to exceed 450 billion kWh; it is expected that electricity demand will exceed 500 billion kWh with an average increase of 5.8% for the high scenario.[24]

***Table 4**: Low and High Demand Projection Scenarios for Ten Years Period (TWh)*

Scenarios	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
High Scenario	307.2	323.8	343.2	363.4	384.8	407.9	431.7	456.5	482.3	508.6
Low Scenario	301.5	315.8	328.4	341.0	354.2	367.9	381.8	396.1	410.5	424.9

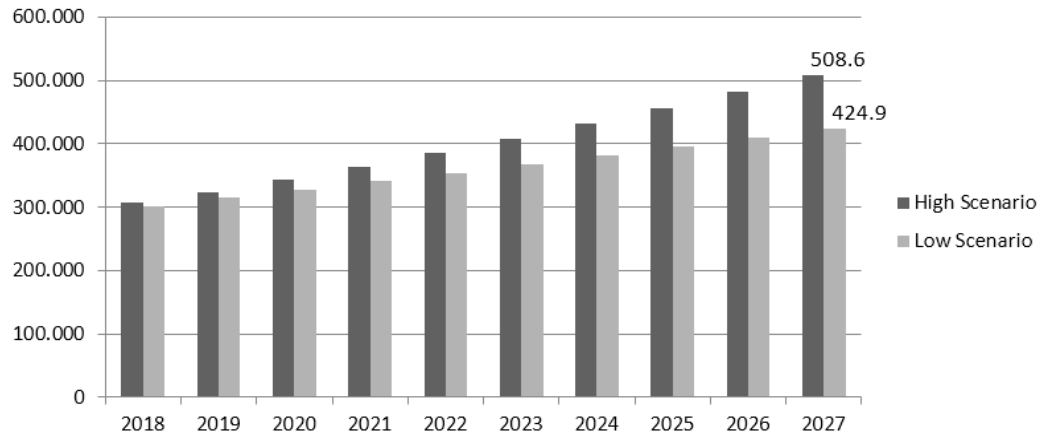

***Figure 7**: Electricity Demand Projections for Ten Years*

In this projection, electricity supplies are also forecasted taking into account all power plants, which are in operation, under construction, solar production facilities within the scope of Public and pre-licensed/licensing phase/licensed/YEKA project, unlicensed biomass, wind, cogeneration production facilities and private sector power plants with licenses, which are expected to be commissioned on the prescribed dates. Generation projection based on fuel-based generation is given in **Table 5**:

[23] Please see: https://www.teias.gov.tr/sites/default/files/2018-02/Taleprapor_2017.pdf

[24] Please see: https://www.teias.gov.tr/sites/default/files/2018-02/Taleprapor_2017.pdf

***Table 5**: Projection of Total Generation Capacity by Fuel Types (TWh)*[25]

YEARS	2017	2018	2019	2020	2021	2022	SHARE IN 2022 (%)
LIGNITE	62.540	68.189	68.057	68.251	71.262	71.262	13.2
HARDCOAL & ASPHALTIT	5.449	5.449	5.449	5.449	5.449	5.449	1.0
IMPORT. COAL	58.855	58.855	59.017	59.017	74.246	74.246	13.8
NATURAL GAS	188.804	197.576	197.450	200.929	200.929	200.929	37.3
GEOTHERMAL	8.257	9.197	9.462	9.480	9.480	9.480	1.8
FUEL OIL	2.138	2.294	2.294	2.294	2.294	2.294	0.4
DIESEL	7	7	7	7	7	7	0
NUCLEER	0	0	0	0	0	0	0
OTHER	1.148	1.848	2.548	3.248	3.948	4.648	0.9
BIOGAS+WASTE	4.280	4.564	4.827	4.967	5.107	5.247	1.0
HYDRO	93.543	97.961	101.290	107.729	109.150	109.164	20.3
WIND	20.807	21.578	24.930	32.349	33.954	34.044	6.3
SOLAR	8.552	14.802	17.302	19.802	21.052	22.302	4.1
TOTAL	**454.381**	**482.320**	**492.634**	**513.523**	**536.878**	**539.073**	**100**

According to the 5-year projection it is clear that fossil fuels will remain the main sources for electricity generation (66.6 % in 2022). Natural gas will continue to dominate the market. Hydro will account for 20.3% of the mix whereas all non-hydro renewable combined (geothermal/biogas/waste/wind/solar) will only account for 13.2% of all electricity generation. This projection is consistent with continuing fossil fuel dependent characteristics of Turkish electricity sector, which is given in **Figure 8**.

[25] Please see: https://www.teias.gov.tr/sites/default/files/2018-09/Kapasite_Projeksiyonu_2018_2022.pdf

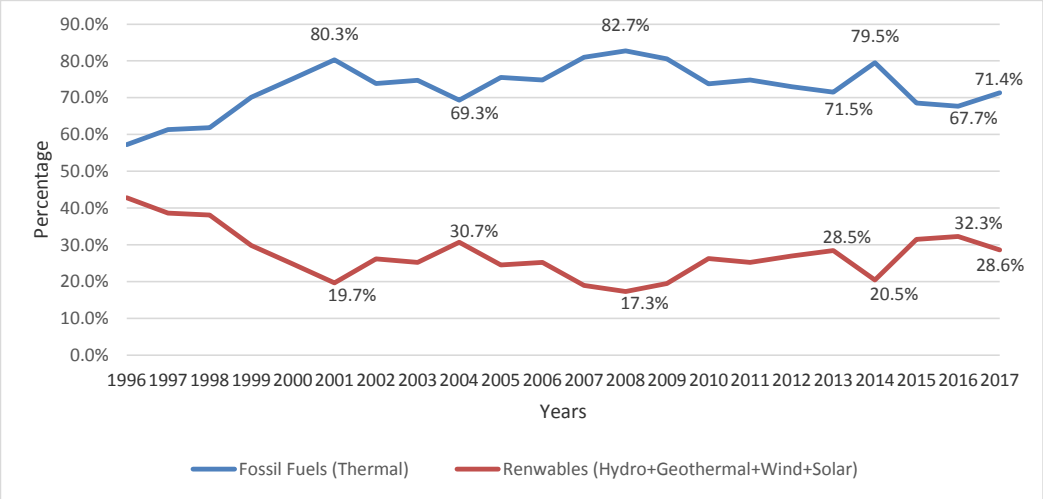

***Figure 8**: Fossil Fuels and Renewable in Turkish Electricity Mix (1996-2017)*[26]

In the shed of above analysis for the baseline scenario (continuation of current situation) it can be concluded that:

• Conclusion-1: Energy demand in Turkey has been increasing with significant rates since ten years, and it is expected to continue at least for next ten years.

• Conclusion-2: Even all operational plants, construction phase plants and licensed ones are taken into account lack of supply is projected after five operational years.[27] So, there is significant need for electricity generation investments to satisfy demand, which means electricity to be generated by the project activity would otherwise be generated by new power plants to avoid power shortage in coming years.

• Conclusion-3: Fossil fuels will hold the dominance in generation mix till the end of 2022 with 66.6% share. Hydro included renewable will remain low with 33.5% share and non-hydro energy contribution will stay with only 13.2% of total share by the end of that period. This also shows that most of new capacity additions will be fossil fuel fired power plants.

The combination of aforementioned trends indicates that if Gezin SPP would not be built, power from a new grid-connected thermal plant would be the most likely scenario.

2.5 Additionality

As per guidance on demonstration of Additionality of small scale Project Activities (ver. 12.0 EB 99 Annex 3), it goes on to provide a positive list of grid-connected renewable electricity generation technologies that are automatically defined as additional, without further documentation of barriers. The list of technologies and project activity types are defined as automatically additional for project size up to and including small scale CDM thresholds (e.g. installed capacity up to 15 MW). The positive list comprises of the following grid-connected and off-grid renewable electricity generation technologies of installed capacity up to 15 MW:

1) Solar technologies (photovoltaic and solar thermal electricity generation);

[26] Please see: http://www.teias.gov.tr/sites/default/files/2018-10/46.xls

[27] Please see: https://www.teias.gov.tr/sites/default/files/2018-09/Kapasite_Projeksiyonu_2018_2022.pdf

2) Off-shore wind technologies;

3) Marine technologies (wave, tidal);

4) Building-integrated wind turbines or household rooftop wind turbines of a size up to 100 kW;

5) Biomass internal gasification combined cycle (BIGCC);

Since the project activity is a solar photovoltaic electricity generation project of capacity 3.83 MW, it can be concluded from the above list that the project activity is automatically additional and does not require demonstration of barriers.

Thus, it is well established that the proposed project activity is additional.

Milestones indicating the project implementation schedule are given below:

Date	Activity ~~(Gezin 3 & Gezin 4 & Gezin 5)~~
15/04/2016	Call Letter for Connection Agreement of Gezin 3 Gezin 4 and Gezin 5
~~24~~17/04/2017	Connection to Distribution System Agreement of Gezin 4
28/04/2017	Connection to Distribution System Agreement of Gezin 3
02/05/2017	Connection to Distribution System Agreement of Gezin 5
28/07/2017	EPC Agreement with Girişim Elektrik of Gezin 3 Gezin 4 and Gezin 5
28/07/2017	Construction Start Date of Gezin 3 Gezin 4 and Gezin 5[28]
12/01/2018	Provisional Acceptance Agreement of Gezin 3 Gezin 4 and Gezin 5
15/01/2018	Usage of Distribution System Agreement of Gezin 3 Gezin 4 and Gezin 5 ~~(Commercial Start Date), First Crediting Period Start Date~~(This date is the commercial start date of Gezin 3 and 4 and 5. Thus this date has been accepted as the crediting period start date of Gezin SPP)
19/01/2018	Call Letter for Connection Agreement of Solarges
17/04/2018	Connection to Distribution System Agreement of Solarges
11/06/2019	Provisional acceptance of Solarges
18/06/2019	System connection agreement of Solarges
14/01/2028	End of the first crediting period.

2.6 Methodology Deviations

There is no methodology deviation.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

Baseline scenario is identified and described in B.4. Emission reductions due to project activity will be calculated according to "Tool to calculate the emission factor for an electricity system"(v7) (Tool)[29] as indicated in AMS I.D.

[28] Please see: EPC Agreement

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

Stepwise approach of "*Tool to calculate the emission factor for an electricity system*" version 07.0 is used to find this combined margin (emission coefficient) as described below:

Step 1. Identify the relevant electric systems

There are 21 regional distribution regions in Turkey but no regional transmission system is defined. In Article 20 of License Regulation it is stated that:

> "*TEIAS shall be in charge of all transmission activities to be performed over the existing transmission facilities and those to be constructed as well as the activities pertaining to the operation of* ***national transmission system*** *via the National Load Dispatch Center and the regional load dispatch centers connected to this center and the operation of Market Financial Reconciliation Center*[30]".

As it can be understood from this phrase, only one transmission system, which is national transmission system is defined and only TEİAŞ is in the charge of all transmission system related activities. Moreover, a communication with representative of TEIAS, which indicates that: "*There are not significant transmission constraints in the national grid system which is preventing dispatch of already connected power plants*" is submitted to the DOE. Therefore, the national grid is used as electric power system for project activity. The national grid of Turkey is connected to the electricity systems of neighboring countries. Complying with the rules of the tool, the emission factor for imports from neighboring countries is considered 0 (zero) tCO_2/MWh for determining the OM. There is no information about interconnected transmission capacity investments, as TEİAŞ, who operates the grid, also didn't take into account imports-exports for electricity capacity projections.[31] Because of that, for BM calculation transmission capacity is not considered.

Step 2. Choose whether to include off-grid power plants in the Project electricity system (optional)

According to Tool project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

> **Option I:** Only grid power plants are included in the calculation.
>
> **Option II:** Both grid power plants and off-grid power plants are included

For this project **Option I** is chosen.

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

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch data analysis OM; or
(d) Average OM.

The Simple Operating Margin (OM) emission factor ($EF_{grid,\ OM,\ y}$) 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. As electricity generation from solar and low cost biomass facilities is insignificant and there are no nuclear plants in Turkey, the only low cost /must run

[30] Please see, www.enermet.com.tr/upload/mce/.../1._electricity_market_licensing_regulation.doc (Page 21)

[31] Please see, http://www.epdk.org.tr/TR/Dokumanlar/Elektrik/YayinlarRaporlar/UretimKapasiteProjeksiyonlari

plants considered are hydroelectric, wind and geothermal facilities. The Turkish electricity mix does not comprise nuclear energy. Also there is no obvious indication that coal is used as must run resources. Therefore, the only low cost resources in Turkey, which are considered as must-run, are Hydro, Renewables and Waste, Geothermal and Wind (according to statistics of TEIAS).

Table 6: *Share of Low Cost Resource (LCR) Production 2013-2017 (Production in GWh)*[32]

Share of Low Cost Resource (LCR) Production 2012-2016 (Production in GWH)					
	2013	**2014**	**2015**	**2016**	**2017**
Gross production	240.153,95	251.962,82	261.783,3	274.407,7	297.277,5
TOTAL LCR Production	69.512,7	52.961,4	83.981,00	89.938,10	85.222,10
Hydro	59.420,47	40.644,70	67.145,83	67.230,90	58.218,50
Renewables and Waste	1.171,20	1.432,59	1.758,19	2.371,60	2.972,30
Geothermal and Wind	8.921,04	10.884,12	15.076,97	20.335,60	24.031,30
Share of LCRs	28,95%	21,02%	32,08%	32,78%	28,67%
Average of last five years	**28,70%**				

As average share of low cost resources for the last five years is far below 50% (28,70%), the simple OM method is applicable to calculate the operating margin emission factor ($EF_{grid,OM,y}$).

For the simple OM, the emissions factor can be calculated using either of the two following data vintages:

- **Ex ante option:** A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, or
- **Ex post option:** The year, in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

The **ex-ante option is selected for Simple OM method**, with the most recent data for the baseline calculation stemming from the years 2015 to 2017.

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 power plants. The calculation of the simple OM emission factor can be based on

- **Option A:** data on net electricity generation a CO_2 emission factor of each power unit, or
- **Option B:** data 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 is chosen to calculate the Simple OM, as there is no power plant specific data available, renewable power generation are considered as low-cost power sources and amount of electricity supplied to the grid by these sources is known.

Where Option B is used, 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, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} x NCV_{i,y} x EF_{CO2,i,y}}{EG_y} \quad \textbf{(1)}$$

[32] Please see: http://www.teias.gov.tr/sites/default/files/2018-10/59%282000-2017%29.xls

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	=	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 (of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	=	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	=	three most recent years for which data is available at the time of submission of the PDD to the DOE for validation

For the calculation of the OM the consumption amount and heating values of the fuels for each sources used for the years 2015, 2016 and 2017, is taken from the TEİAŞ annual statistics, which holds data on annual fuel consumption by fuel types as well as electricity generation amounts by sources and electricity imports. All the data needed for the calculation, including the emission factors and net calorific values (NCVs), are provided in excel table that shows OM emission factor, Excel Table 8 Fossil Fuel Consumption Amounts and Excel Table 9 Net Calorific Values. Total CO_2 emission due to electricity generation in Turkey for the years of 2015, 2016 and 2017 are given in **Table 7**.

***Table 7**: CO_2 emissions from electricity production 2015-2017 ($ktCO_2$)*

	2015	**2016**	**2017**
CO_2-Emmissions	113,727	123,437	133,025

Table 8 presents the gross electricity production data by all the relevant energy sources. Low-cost/must run resources like hydro, wind, geothermic and biomass do not emit fossil CO_2 and thus are not taken into account in calculations.

***Table 8:** Gross electricity production by fossil energy sources 2015-2017 (GWh)*[33]

Gross Electricity Production by Energy Source 2015-2017 [GWh]			
Natural Gas	99,218.70	89,227.10	110,490.00
Lignite	31,335.70	38,569.90	40,694.40
Coal	44,829.90	53,703.20	56,781.90
Fuel Oil	980.4	969.10	520.60
Motor Oil	1,243.60	957.20	679.30
Naphtha	0.0	0.0	0.0
LPG	0.0	0.0	0.0
Total fossil fuels	177,608.3	183,426.5	209,166.2

Above table shows gross data, but EG_y in the above described formula means electricity delivered to the grid, i.e. net generation, the following table shall help to derive net data by calculating the net/gross proportion on the basis of overall gross and net production numbers.

***Table 9**: Net/gross electricity production 2015-2017 (GWh)*[34]

Relation Net/Gross Electricity Production 2015-2017

[33] Please see: http://www.teias.gov.tr/sites/default/files/2018-10/59%282000-2017%29.xls

[34] Please see: http://www.teias.gov.tr/sites/default/files/2018-10/56%2893-2017%29.xls

Gross Production [GWh]	261,783.30	274,407.70	297,277.50
Net Production [GWh]	249,889.50	261,936.80	284,257.50
Relation	95.46%	95.46%	95.62%

Multiplying these overall gross/net relation percentages with the fossil fuels generation amount does in fact mean an approximation. However this is a conservative approximation as the consumption of plant auxiliaries of fossil power plants is higher than for the plants that are not included in the baseline calculation. In the end this would lead to a lower net electricity generation and therefore to a higher OM emission factor and higher emission reductions.

Table 10 shows the resulting net data for fossil fuel generation and adds electricity imports.

Table 10: *Electricity supplied to the grid, relevant for OM (GWh)*

Net El. Production by fossil fuels and Import 2015-2017 [GWh]			
Net El. Prod. by fossil fuels	169,538.9	175,090.4	200,005.3
Electricity Import	7,135.5	6,330.3	2,728.3
Electricity supplied to grid by relevant sources	176,674.4	181,420.7	202,733.6

Electricity import is added to the domestic supply in order to fulfill the Baseline Methodology requirements. Imports from connected electricity systems located in other countries are weighted with an emission factor of 0 (zero) tCO_2/MWh.

The last step is to calculate $EF_{grid,OMsimple,y}$:

Table 11: Calculation of Weighted $EF_{grid,OMsimple,y}$ ($ktCO_2/GWh$)

	2015	2016	2017
CO2-Emmissions (ktCO2)	113,727	123,437	133,025
Net Electricity Supplied to Grid by relevant sources (GWh)	176,674.4	181,420.7	202,733.6
EFgrid,OMsimple,y (ktCO2/GWh)	0.6437	0.6804	0.6562
3-year Generation Weighted Average $EF_{grid,OMsimple,y}$ ($ktCO_2/GWh$)	0.6601		

$EF_{grid,OMsimple,y}$ = 0.6601 ($ktCO_2/GWh$)

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

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 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.

Again, the project proponents can chose between two options according to the calculation tool: calculate the BM ex-ante based on the latest available data or update the BM each year ex post. Option 1, the ex-ante approach, is again chosen.

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above. There is no official data available on plant-based annual electricity production for years 2013, 2014, 2015, 2016 and 2017. The most recent official data available on plant-based annual electricity production belongs to year 2012. In order to update the BM to the year 2017, the only data which can used to estimate the annual production is the installed capacity of plants. It can be assumed that every power plant operates with full capacity all around the year in order to tackle this data problem. It should be noted that the usage of capacity is a CDM Executive Board approved deviation from the methodology AM005 for a similar situation. According to the CDM-EB-approved deviation, in the absence of annual production data use of weights estimated using installed capacity in place of annual electricity generation is permitted.[35]

While determining the sample group, energy investments data from Ministry of Energy and Natural Sources website[36] is used. VER plants are excluded from sample group. While identifying the sample group dismantled, revised, retrofits are not included. Only new capacity additions (power plants / units) are taken into account. All power plants put in operation until the end of 2017 are given in Excel Table 12 Sample Group for BM Factor Calculation (Latest Power Plants put in Operation in Turkey). Total installed capacity at the end of 2017 is 85,200.1 MW and 20% of this capacity is 17,040.02 (AEGSET->20%) MW and total installed capacity of last five power plants put in operation in 2017 is 856.15 MW (AEGSET-5-units). Since AEGSET->20% is bigger than AEGSET-5-units, SET->20% is chosen as SETsample. Also in the sample group there is no power plant started supply electricity to grid more than 10 years ago, steps d, e and f are ignored.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

[35] Please see: http://cdm.unfccc.int/filestorage/A/M/_/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ2/Several%20projects%20in%20China%20%28application%20of%20approved%20methodology%20AM0005%29.pdf?t=d1h8cGlsM2dqfDAa2Ej_S79ygpyv18-h9mdh

[36] Please see: http://www.enerji.gov.tr/tr-TR/EIGM-Raporlari

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} x EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \textbf{(2)}$$

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 data is available

Since fuel consumption and electricity generation data is not available for the Turkey's case, *Option A2* of Simple OM method is used to calculate emission factor. The formulation of emission factor is given below:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} x 3.6}{\eta_{m,y}} \quad \textbf{(3)}$$

Where:

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$EF_{CO2,m,i,y}$	=	Average CO_2 emission factor of fuel type i used in power unit m in year y (tCO_2/GJ)
$\eta_{m,y}$	=	Average net energy conversion efficiency of power unit m in year y (%)
m	=	All power units serving the grid in year y except low-cost/must-run power units
y	=	Most recent year for which data is available at the time of submission of the PDD to the DOE

$EF_{EL,m,y}$ calculation and results is given in **Table 12**. For BM factor calculation, since no official emission factors for different fuel types are available, lower confidence default values of IPCC Guidelines are applied. Explanation of emission factor selection for each energy sources and references are given in EF Calculation Excel.

Table 12: $EF_{EL,m,y}$ calculation by using equation (3)

Fuels Used in Set Sample	**Effective CO2 emission factor (tCO2/GJ)**	**Average Efficiency (ηm,y)**	**$EF_{EL,m,y}$ (tCO2/MWh)**
Natural Gas	0.0543	62.00%	0.3153
Lignite	0.0909	50.00%	0.6545
Import Coal	0.0895	50.00%	0.6444

For the calculation of $EF_{grid,BM,y}$, since there is no data available on plant-based annual electricity generation, it can be assumed that every power plant operates with full capacity all around the year. Moreover, since this assumption affects both numerator and denominator of equation (2), multiplication of installed capacity with 8760 hours/year would cancel each other. Therefore by using data on **Table 13** and using the equation (2), $EF_{grid,BM,y}$ is calculated and presented below. Lastly, Gross/Net Electricity Generation difference is taken into account while calculating $EF_{grid,BM,y}$.

Table 13: Data used for $EF_{grid,BM,y}$ calculation

	Total Natural Gas Capacity Addition (MW)	Emission Addition of NG (MW*tCO_2/MWh)	Total Lignite Capacity Addition (MW)	Emission Addition of Lignite (MW*tCO_2/MWh)	Total Import Coal Capacity Addition (MW)	Emission Addition of Import Coal (MW*tCO_2/MWh)
Sample Group Total	6130.921	1933.020	925.8	605.917	3479.7	2242.318

$EF_{grid,BM,y}$ = 0.2900 tCO_2/MWh

Step 6. Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor (*EFgrid,CM,y*) is based on one of the following methods:
(a) Weighted average CM; or
(b) Simplified CM.

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM} \quad \textbf{(4)}$$

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OMy}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)

$EF_{grid,CM,y}$ = 0.6601 tCO2/MWh * 0.75 + 0.2900 tCO2/MWh * 0.25

=0.5676 tCO2/MWh

According to the Tool for solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25.

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(5)}$$

Where:
ER_y = Emission reductions in year *y* (t CO_2/yr).
BE_y = Baseline emissions in year *y* (t CO_2/yr).
PE_y = Project emissions in year *y* (t CO_2/yr).
LE_y = Leakage emissions in year *y* (t CO_2/yr).

Project emissions
The proposed project activity involves the generation of electricity by development of a solar plant. The generation of electricity does not result in greenhouse gas emissions and therefore is taken as 0 tCO_2/year.

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

Then: $ER_y = BE_y$

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

$BE_y = (EG_y - EG_{baseline}) \times EF_{grid,CM,y}$ **(6)**

Where:
BE_y = Baseline emissions in year *y* (tCO_2/yr).
EG_y = Electricity supplied by the project activity to the grid (MWh).
$EG_{baseline}$ = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero.
$EF_{grid,CM}y$ = Combined margin CO2 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 (v7)".
The project activity is the installation of a new grid-connected renewable power plant so, $EG_{baseline} = 0$

3.2 Project Emissions

The proposed project activity involves the generation of electricity by development of a solar power. The generation of electricity does not result in greenhouse gas emissions and therefore is taken as 0 tCO2/year.

3.3 Leakage

The emission reduction is equal to the baseline emissions minus project emissions and leakage emissions. Leakage emissions in this project are considered to be negligible. There are no project emissions in this kind of project.

3.4 Net GHG Emission Reductions and Removals

As per AMS I.D, the baseline emissions are calculated as the net electricity generated by the project activity, multiplied with the baseline emission factor for the project grid. Baseline emissions calculated as explained in section B.6.1 above are summarized as below.

BEy = (EGy - EGbaseline) x EFgrid,CM,y , $EG_{baseline} = 0$

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

Where,

EGy = the net electricity exported to the grid system during the year y (MWh/annum)
EFy = the emission factor of the grid to which the project exports electricity (tCO2/MWh)
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OMy}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)

To calculate $EF_{grid,OMsimple,y}$:

	2015	2016	2017
CO2-Emmissions (ktCO2)	113,727	123,437	133,025
Net Electricity Supplied to Grid by relevant sources (GWh)	176,674.4	181,420.7	202,733.6
EFgrid,OMsimple,y (ktCO2/GWh)	0.6437	0.6804	0.6562
3-year Generation Weighted Average $EF_{grid,OMsimple,y}$ ($ktCO_2$/GWh)	**0.6601**		

$EF_{grid,OMsimple,y}$ = 0.6601 ($ktCO_2$/GWh)

Hence,
w_{OM} = 0.75 and w_{BM} = 0.25. Then:

$EF_{grid,CM,y}$ = 0.6601 tCO2/MWh * 0.75 + 0.2900 tCO2/MWh * 0.25
=0.5676 tCO2/MWh

***$ER_y = BE_y = EG_y$ * $EF_{grid,CM,}$* = 6963 MWh/year * 0.5676 tCO_2/MWh = 3,952 tCO_2/year**

Project emissions

The proposed project activity involves the generation of electricity by development of a solar plant. The generation of electricity does not result in greenhouse gas emissions and therefore is taken as 0 tCO_2/year.

Leakage
No leakage emissions are applicable.

Emission reductions

ERy = $ER_y = BE_y - PE_y - LE_y$ = 3,952 – 0 – 0
ERy = 3,952 tCO2 (ERy = BEy)

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
15/01/2018-31/12/2018	3,800	0	0	3,800
2019	3,952	0	0	3,952
2020	3,952	0	0	3,952
2021	3,952	0	0	3,952
2022	3,952	0	0	3,952
2023	3,952	0	0	3,952
2024	3,952	0	0	3,952
2025	3,952	0	0	3,952
2026	3,952	0	0	3,952
2027	3,952	0	0	3,952
01/01/2028-14/01/2028	152	0	0	152
Total	**39,520**	0	0	**39,520**

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	**EG_y**
Data 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 or hour h
Source of data	Turkish Electricity Transmission Company (TEIAS), Annual Development of Turkey's Gross Electricity Generation by Primary Energy Sources (2000-2017) TEIAS, see http://www.teias.gov.tr/sites/default/files/2018-10/59%282000-2017%29.xls
Value applied	See Table 1, Table 5, Table 7
Justification of choice of data or description of measurement methods and procedures applied	TEIAS is the national electricity transmission company, which makes available the official data of all power plants in Turkey. Thus, for reliability, TEIAS data is used. Net electricity generation is calculated using gross and net production for all fuel types. This data is used to find relation between the gross and net electricity delivered to the grid by fossil fuel fired power plants (Table 4). Also, gross and net electricity production for related fuel types and Import and Export data are used to find total net electricity fed into the grid in the years of 2015, 2016 and 2017 (Table 6).
Purpose of Data	Data used for emission reduction calculation
Comments	

Data / Parameter	**HVi,y**
Data unit	Tcal
Description	Heating Values of fuels consumed for electricity generation in the years of 2015, 2016 and 2017
Source of data	Heating Values Of Fuels Consumed In Thermal Power Plants In Turkey By The Electric Utilities, TEİAŞ. See: https://www.teias.gov.tr/tr/iv-turkiye-termik-santrallarinda-kullanilan-yakit-miktarlari-isil-degerleri-ve-kojenerasyon-0 (Excel File 75)
Value applied	See, Excel Table 7: Heating Values of Fuels (Tcal)
Justification of choice of data or description of measurement methods and procedures applied	TEİAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey. There is no national NVC data in Turkey. However, TEİAŞ announces Heating values of fuels. This data is used to calculate annual NCVs for each fuel type.
Purpose of Data	Data used for emission reduction calculation
Comments	

Data / Parameter	**FCi,y**
Data unit	Mass or volume unit
Description	Amount of fuel type i consumed in the project electricity system in year y
Source of data	Heating Values Of Fuels Consumed In Thermal Power Plants In Turkey By The Electric Utilities, TEİAŞ. See: https://www.teias.gov.tr/tr/iv-turkiye-termik-santrallarinda-kullanilan-yakit-miktarlari-isil-degerleri-ve-kojenerasyon-0 (Excel File 73)
Value applied	See, Excel Table 8: Fossil Fuel Consumption Amounts**Error! Reference source not found.**
Justification of choice of data or description of measurement methods and procedures applied	TEİAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Purpose of Data	Data used for emission reduction calculation
Comments	

Data / Parameter	**NCVi,y**
Data unit	GJ/mass or volume unit
Description	Net Calorific Value of fuel types in the years of 2015, 2016 and 2017
Source of data	Calculated by using HVi,y to FCi,y as Net Calorific Values of fuel types are not directly available in Turkey.
Value applied	See, Excel Table 9: Net Calorific Values of Fuels and Emission Factor
Justification of choice of data or description of measurement methods and procedures applied	TEİAŞ is the national electricity transmission company, which makes available the official data of power plants in Turkey. Calculation of NCVs from national HVi,y and FCi,y data is preferred to default IPCC data as these are more reliable.

Purpose of Data	Data used for emission reduction calculation
Comments	

Data / Parameter	**Sample Group for BM emission factor**
Data unit	Company names, plant names, licence dates, licence numbers, fuel types, plant capacities in MW and provisional acceptance dates.
Description	Most recent power plants which compromise 20% of total capacity
Source of data	Energy Investments, Ministry of Energy and Natural Sources: http://www.enerji.gov.tr/tr-TR/EIGM-Raporlari
Value applied	See, Excel Table 12: Sample Group for BM
Justification of choice of data or description of measurement methods and procedures applied	Ministry of Energy and Natural Sources is the governmental authority for energy investments and natural sources in Turkey.
Purpose of Data	Data used for determining sample group for BM calculation
Comments	

Data / Parameter	$\mathbf{EF_{CO2,i,y}}$
Data unit	tCO_2/GJ
Description	CO_2 emission factor of fuel type i in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the IPCC Guidelines on National GHG Inventories. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied	See, Excel Table 9: Net Calorific Values of Fuels and Emission Factor
Justification of choice of data or description of measurement methods and procedures applied	No plant specific and national emission factor data is available in Turkey. So, IPCC default data is used.
Purpose of Data	Data used for emission reduction calculation
Comments	

Data / Parameter	$\eta_{m,y}$
Data unit	-
Description	Average energy conversion efficiency of power unit m in year y
Source of data	Appendix, Table 2 of the "Determining the baseline efficiency of thermal or electric energy generation systems"(v.02)
Value applied	See, Excel Table 11: Calculation of EFel
Justification of choice of data or description of measurement methods and procedures applied	For efficiency rates of Natural Gas, Coal and Lignite Power Plants See Appendix, Table 2 of the Tool (highest rate is applied to be conservative): https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-09-v2.0.pdf
Purpose of Data	Data used for emission reduction calculation
Comments	

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant to the grid in year *y*
Source of data	On site measurement from the meters.
Description of measurement methods and procedures to be applied	There are 6 meters in total: ~~3~~ 4 main meter and ~~3~~ 4 back-up meter for Gezin 3, Gezin 4, ~~and~~ Gezin 5 and Solarges. These meters are sealed by EDAŞ and intervention by project proponent is not possible. The fact that the meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is not only in the interest of the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyers.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value applied	6,963 MWh/year
Monitoring equipment	For the unlicensed plant, readings from main and back-up meters will be used. Electricity generation data is provided monthly by Fırat EPSAŞ and this data will be used in emission reduction calculations in upcoming verifications.
QA/QC procedures to be applied	According to the Article 2 of the Communiqué of Meters in Electricity Sector[37]: '*The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained "Type and System Approval" certificate from the Ministry of Trade and Industry.*' Therefore, Ministry of Trade and Industry (Ministry) is responsible from control and calibration of the meters. Also according to Article 11 of this Communiqué, meters shall be in class of 0.5s, which means error interval for measuring is in +-0.5% range which is well acceptable according to rules. Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems'[38] (Regulation) of Ministry states that: ' *b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years.'* Therefore periodic calibration of the meters will be done every 10 years according to the regulation. Also according to Article 67 (page 20) of this regulation, the calibration shall be done in calibration stations which have been tested and approved by Ministry of Trade and Industry. Article 10 d) of Communiqué requires the meters shall be three phase four wire and Article 64 of Regulation clearly states how calibration shall be performed for this kind of meters. As above mentioned, the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan.

[37] See, www.epdk.org.tr/TR/Dokuman/3156

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

Purpose of data	Calculation of Baseline and Project Emission
Calculation method	
Comments	Plant Manager will be responsible for monitoring data.

4.3 Monitoring Plan

As the necessary baseline emission factors are all defined ex ante (Operating and Built Margin, see baseline description), the most important information to be monitored is the amount of electricity fed into the grid by Gezin SPP. This value will be monitored continuously by redundant metering devices, one of them being the main one in the substation.

As Gezin SPP is an unlicensed project, it is responsible under provisions of Regulation on Unlicensed Electricity Production under Electricity Market[39] which is enacted by Republic of Turkey Energy Market Regulatory Authority (EMRA). Under the provisions of abovementioned regulation, unlicensed plants can only sell their electricity to an electric retail company which is Fırat EPSAŞ for Gezin SPP. (Fırat EDAŞ is the distribution company for Gezin SPP). Electricity generation data is provided monthly by Fırat EPSAŞ and this data will be used in emission reduction calculations in upcoming verifications.

There are ~~6~~ 8 meters in total: ~~3~~ 4 main meter and ~~3~~ 4 back-up meter for Gezin 3, Gezin 4, ~~and~~ Gezin 5 and Solarges. These meters are sealed by Fırat EDAŞ and intervention by project proponent is not possible. The fact that the meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is not only in the interest of the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyers.

Meter specifications are as follows[40]:

[39] Please see, http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.18911&MevzuatIliski=0&sourceXmlSearch=elektrik%20piyasas%C4%B1nda%20lisanss%C4%B1z

[40] Please see meter photographs and http://makel.com.tr/download/files/salt-ve-endustriyel-urunler-fiyat-listesi_2017_5338455331.pdf

Table 14: Meter Specifications

	Gezin 3		Gezin 4		Gezin 5		Solarges	
	Main Meter	Back-Up Meter	Main Meter	Back-Up Meter	Main Meter	Back-Up Meter	Main Meter	Back-Up Meter
Type	MAKEL C510.AMT.5851						MAKEL C520 AMT 2556	
Production Standard and Class	C							
Serial Number	65002578	65002507	65002640	65003077	65002425	65002695	80223926	80244924
Accuracy Class	0.5S							
Calibration Date	25.08.2017	24.08.2017	24.08.2017	24.08.2017	25.08.2017	25.08.2017	08/10/2018	18/01/2019

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	~~Gezin 3~~		~~Gezin 4~~		~~Gezin 5~~	
	~~Main Meter~~	~~Back-Up Meter~~	~~Main Meter~~	~~Back-Up Meter~~	~~Main Meter~~	~~Back-Up Meter~~
~~**Type**~~	~~MAKEL C510.AMT.5851~~					
~~**Production Standard and Class**~~	~~C~~					
~~**Serial Number**~~	~~65002578~~	~~65002507~~	~~65002640~~	~~65003077~~	~~65002425~~	~~65002695~~
~~**Accuracy Class**~~	~~0.5S~~					
~~**Calibration Date**~~	~~25.08.2017~~	~~24.08.2017~~	~~24.08.2017~~	~~24.08.2017~~	~~25.08.2017~~	~~25.08.2017~~

Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems'[41] (Regulation) of Ministry states that: ' *b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years.'* Therefore periodic calibration of the meters will be done every 10 years according to the regulation. As can be seen from the table, none of the meters need calibration for the next 10 years.

Personnel at the plant keep records for electricity generation amount and reports to operation manager on a monthly basis. Records are kept in electronic format for 2-years basis. The data is monitored via electricity meters. There are ~~6~~ 8 meters in total for the projects. Meters are remotely read (via OSOS system) by distribution company (Fırat EDAŞ) monthly. Yearly electricity generation will be calculated by summing up monthly meter reading records. Data monitored will be kept in electronic form and hard copy until the end of second year after the end of crediting period. These records can be used for monitoring in case of any problem will arise in meters.

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

The collected data will be kept by Lahit during the crediting period and until two years after the last issuance of VERs for the Gezin SPP activity for that crediting period.

Given a data vintage based on ex ante monitoring and selection of a renewable 10-year crediting period, the Combined Margin will be recalculated at any renewal of the crediting period using the valid baseline methodology.

Potential leakage emissions in the context of power sector projects are emissions arising due to activities such as power plant construction, fuel handling and land inundation. However, according to the methodology, those emission sources do not need to be taken into account.

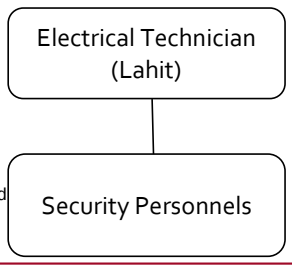
Operational and Management Structure

As described before, there are two main factors important for the calculation of emission reductions. The only relevant data that have to be monitored is only net electricity generation (EGfacility,y) per year. Since project emission is zero no additional monitoring is required. The generation data are subject to the strict internal quality control systems of both parties. The monthly meter reading documents are stored by Lahit and Fırat EDAŞ (Distribution Company). The settlement notification, which is issued by Fırat EDAŞ and includes the meter reading data, is stored on Fırat EDAŞ file server and accessible for Lahit and Petrojes that can read them manually when they want. The meters themselves can always be read as plausibility check for verification. The other important parameter is the emission factor. It is approved according to strict quality control parameters from an independent external party. With this, no additional structures or processes have to be implemented to insure the availability and high quality of the necessary data for monitoring.

At the end of each monitoring period, which is planned to generally last one year, from the monthly meter reading records the net electricity generation amounts as calculated by electricity supplied to the grid minus withdrawn from the system, will be added up to the yearly net electricity generation and total project emissions will be subtracted from this amount and result data will be multiplied with the combined margin emission factor with the help of an excel spread sheet that also contains the combined margin calculation. Thus, the complete baseline approach is always transparent and traceable. For the elaboration and quality assurance of the monitoring report, **Life Enerji**, an expert in the project mechanisms who already supported in the project design, is assigned. However, in order to continue improving the monitoring procedures and therefore also the future monitoring reports, internal quality check shall be fulfilled by **Life Enerji**. The monitoring reports are checked and in cases of mistakes and inconsistencies in the monitoring report, revisions with improvements shall be done. Furthermore, external year verification assures that the emission reductions calculations are transparent and traceable.

Lahit will keep all the data needed for the calculation of emission reductions during the crediting period and until two years after the last issuance of VERs for Gezin SPP. Organizational structure is as follows:

There is an electrical technician from Lahit who is in charge of the projects' operation and maintenance works. Besides, there are 3 security personnel in total at the plant.[42] They will be working on different shifts. Organizational structure is provided in Figure 9.



[42] Please see Petrojes salary roll document and

Figure 9: Organizational Structure

Because of the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan. Dedicated emergency procedures are not provided, as there is no possibility of overstating emission reductions due to emergency cases.

Name of entity determining the baseline:

~~Kerem Ziya Akdemir~~İklim Şahin
Life İklim ve Enerji Ltd. Şti (Life Enerji) (Project Consultant)
Oğuzlar Mah. 1377. Sok. No:19/9, 06460, Çankaya/Ankara
Tel: +90 312 481 21 42
Fax: +90 312 480 88 10
e-mail: ~~kerem.akdemir~~iklim.sahin@lifeenerji.com
Contributor: Life İklim ve Enerji Ltd. Şti.

5 SAFEGUARDS

5.1 No Net Harm

During the site visit, interviews with the locals showed that there are no negative feedbacks from the stakeholders. Yet, under this section, mitigation measure against potentially negative indicators has been discussed.

No		1
Indicator		Water Quality and Quantity
Mitigation measure		Storing the wastewater in a septic tank and will be transferring to wastewater treatment plant when septic tank will be completely full
Chosen parameter		Amount of avoided wastewater discharged to the environment
Current situation of parameter		No wastewater discharged to the environment in the project area.
Estimation of baseline situation of parameter		No wastewater discharged to environment
Future target for parameter		Continuation of current situation
Way of monitoring	How	Records of transfer of wastewater by sewage truck
	When	Each verification
	By who	Assigned technician by Plant Manager or assigned carbon consultant

5.2 Environmental Impact

According to the relevant Environmental Impact Assessment Regulation for Gezin Solar Power Project, an Environmental Impact Assessment is not required. The official letters from Provincial Directorate of Environment and Urbanization confirming non-applicability of this regulation is available to DOE during validation process.[43]

[43] Please see EIA out of scope document.

5.3 Local Stakeholder Consultation

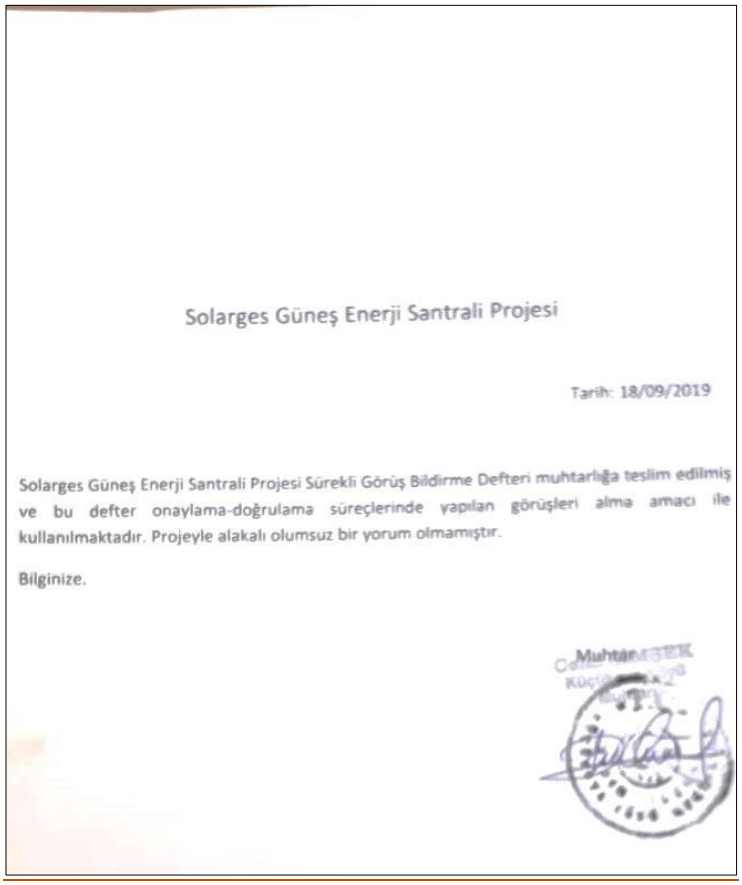
Stakeholder engagement procedure was conducted at the Gezin Solar Power Project control room with the Küçükova village head and the local stakeholders on 11st of December 2018.[44]

As validated during the site visit, muhtar (head of the village) had already taken the contact information of Company Executive of the company so that the local stakeholders will be able to reach company executive whenever they have any complaints, suggestions or ideas about the project.[45]

~~Since muhtar is the head of the village, he will be the main contact person between the project owner and the local stakeholders~~. Also Project owner provided a logbook to the Muhtar to be accessible for villager's feedback. This logbook and invitation announcement for comments is posted on the Küçükova village's mosque wall on 18/09/2019, which is the only common place at the center of the village. Comments/complaints to be registered by villagers will be conveyed to the project owner by Muhtar for possible actions. This logbook will also be provided to DOE during all verifications to check comments and response of the project owner. Delivery record of the logbook to the Muhtar and photo of the post are given below: ~~Muhtar will make sure that there's continuous communication between the two parties~~.

[44] Please see attendance list of the meeting

[45] Please see the muhtar's signed declaration on contact information.



Solarges Güneş Enerji Santrali Projesi

Tarih: 18/09/2019

Solarges Güneş Enerji Santrali Projesi Sürekli Görüş Bildirme Defteri muhtarlığa teslim edilmiş ve bu defter onaylama-doğrulama süreçlerinde yapılan görüşleri alma amacı ile kullanılmaktadır. Projeyle alakalı olumsuz bir yorum olmamıştır.

Bilginize.

Muhtar

Figure 1 Logbook Delivery Record to the Muhtar

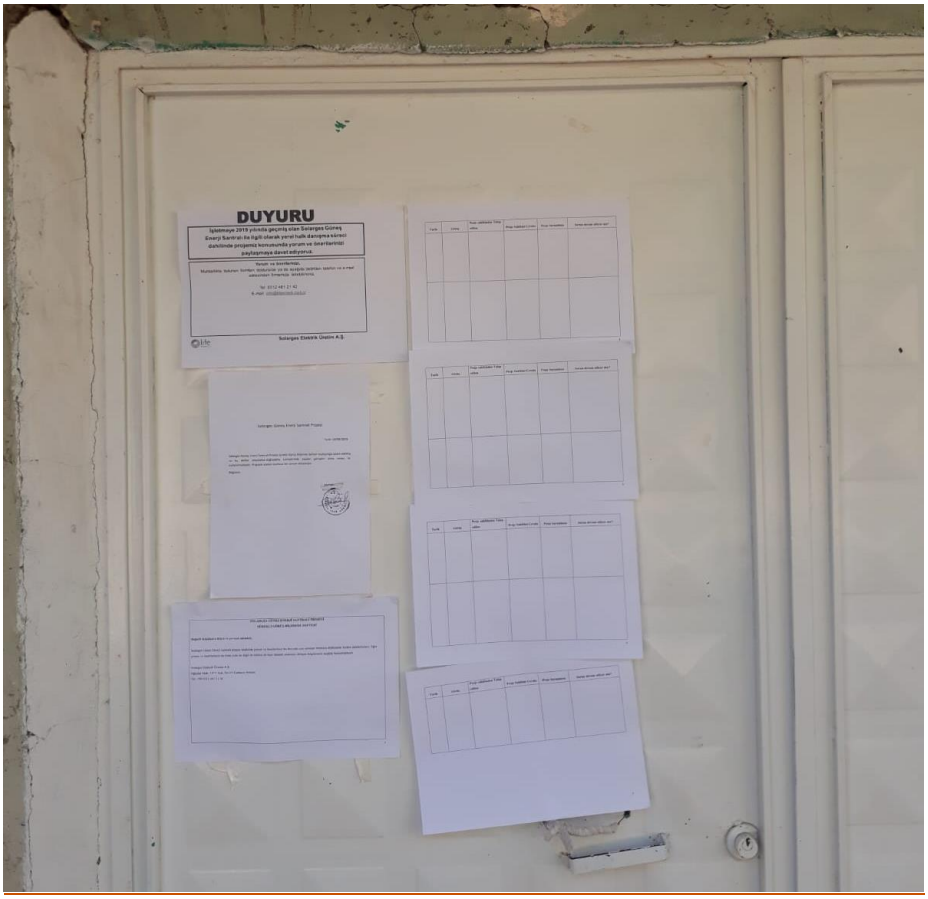


Figure 2 Logbook Announcement Post

5.4 Public Comments

According to VCS Rules[46], all projects are subject to 30-day comment period. The date on which the project is listed on the project pipeline marks the beginning of the commenting period and the project shall remain on the project pipeline for the entirety of 30-day public comment period. The project listed on the project pipeline 13 March 2019[47]. Therefore 30-day comment period is completed on 13 April 2019 and during the period no public comments received.

~~There are no public comments.~~

[46] VCS Standard v3.7, 3.17.5:8 (https://verra.org/wp-content/uploads/2018/03/VCS_Standard_v3.7.pdf)

[47] Ref: https://www.vcsprojectdatabase.org/#/pipeline_details/PL1870