

ÜÇPINAR WIND POWER PROJECT, TURKEY

Document Prepared By Life Enerji

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Derbent Enerji Üretim Pazarlama İthalat ve İhracat A.Ş. (hereafter referred to as “**Üçpınar**”) invested into a new Wind Power Project called **Üçpınar Wind Power Project, Turkey** (hereafter referred to as the “**Project**” or “**Üçpınar WPP**”), which involves installation and operation of 3 MWe wind turbines. The project consists of 33 wind turbines. The generated energy will be fed to the grid Çan Havza TM.¹

An **estimated electricity net generation of 317,500 MWh² per year** by the efficient utilization of the available wind energy by project activity will replace the grid electricity, which is constituted of different fuel sources, mainly fossil fuels. The electricity produced by project activity will result in a **total emission reduction of 180,199 tonnes of CO₂e/year**. The total emission reduction by the project activity is estimated to be **1,801,990 tonnes of CO₂e** for the first crediting period, which is 18/06/2019 to 17/06/2029. Moreover, project activity will contribute further dissemination of wind energy and extension of national power generation.

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

- reduce greenhouse gas emissions in Turkey compared to the business-as-usual scenario;
- help to stimulate the growth of the wind power industry in Turkey;
- create local employment during the construction and the operation phase of the wind 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.

1.2 Sectoral Scope and Project Type

Title: Grid Connected Electricity Generation from Renewable Sources

Reference: ACM0002 (Version 19)³

For the determination of the baseline, the official methodology ACM0002 version 19, “Large-scale Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, is applied, using conservative options and data as presented in the following section. This methodology refers to five Tools, which are:

1. Tool to calculate the emission factor for an electricity system (Version 07.0)⁴;
2. Tool for the demonstration and assessment of additionality (Version 07.0.0)⁵;
3. Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)⁶;

¹ Please see license of the project

² Please see energy yield assessment report. The details is given in the CM Calculation Excel.

³ Please see ACM0002 Version 19: <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

⁴ Please see <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

⁵ Please see <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

⁶ Please see <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v7.0.pdf>

4. Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 03.0)⁷.
5. Tool to determine the remaining lifetime of the equipment (Version 01)⁸

The first tool is used for baseline calculation and second tool is used for additionality assessment. As third tool is the combination of the first and second tool, it is not used. Since no project emission or leakage calculation is required for wind power project, fourth tool is not used, and finally to determine the remaining lifetime of the equipment, fifth tool is used.

Since the project activity is a wind power plant, the respective sectoral scope is scope 1: “Energy Industry – Renewable/Non-renewable Sources”. Project participant hereby confirms that this is not a grouped project.

1.3 Project Proponent

Organization name	Derbent Enerji Üretim Pazarlama İthalat ve İhracat A.Ş.
Contact person	Melis Ünal
Title	Electrical Works Specialist
Address	Akfen Yenilenebilir Enerji A.Ş. Turan Güneş Bulvarı Galip Erdem Cad. No: 3 Çankaya/ANKARA
Telephone	+90 (312) 408 10 00 - 1434
Email	munal@akfen.com.tr

1.4 Other Entities Involved in the Project

Organization name	Life İklim ve Enerji Ltd. Şti.
Role in the project	Project Consultant
Contact person	Ramazan Aslan
Title	Carbon Deputy Director
Address	Oğuzlar Mah. 1377. Sk. No:19/9 Balgat, Çankaya/Ankara
Telephone	+90 312 481 21 42
Email	ramazan.aslan@lifeenerji.com

1.5 Project Start Date

Project start date is 18/06/2019⁹ that is the first GHG emission reductions. This is the official start date of the project.

⁷ Please see <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf>

⁸ Please see <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf>

⁹ Ref: <https://www.epdk.gov.tr/Detay/DownloadDocument?id=UIQsZmj07N4=> (cell:N583) and <https://www.epdk.gov.tr/Detay/Icerik/3-0-72/elektrikyekdem>

1.6 Project Crediting Period

Start date of the crediting period is 18/06/2019, and it shall be a crediting period of 10 years, and it will be renewed twice. The lifetime of the project activity is 49 years.

First crediting period is 18/06/2019 to 17/06/2029.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	x
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
18.06.2019-31.12.2019	97,258
2020	180,199
2021	180,199
2022	180,199
2023	180,199
2024	180,199
2025	180,199
2026	180,199
2027	180,199
2028	180,199
01.01.2029 - 17.06.2029	82,941
Total estimated ERs	1,801,990
Total number of crediting years	10
Average annual ERs	180,199

1.8 Description of the Project Activity

The technology chosen is wind turbines utilizing wind power into energy. The key parameters about the technical design of the selected model **Siemens SWT-3.4-108** turbines are listed below in **Table 1**

Table 2: Technical specifications of Siemens SWT-3.4-108 Curtailed to 3MW¹⁰

Specifications	Siemens SWT-3.4-108 Curtailed to 3 MW
Rated Power (kW)	3000 ¹¹
Rotor Diameter (m)	108
Num. of Blades	3
Hub Height (m)	79.5
Cut-out wind speed (m/s)	29

¹⁰ Please see: Site-Related Wind Potential Analysis and Energy Yield Assessment

¹¹ Please see license of the project

Technical life time of Üçpınar WPP is determined by using the “Tool to determine the remaining lifetime of equipment” (v.1)¹². 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 warranty¹³.

1.9 Project Location

The project is located in Çanakkale Province, Lapseki District, Üçpınar Village. Location of the project is given in Figure 1. Moreover, the coordinates of the project activity are given under Table 2.

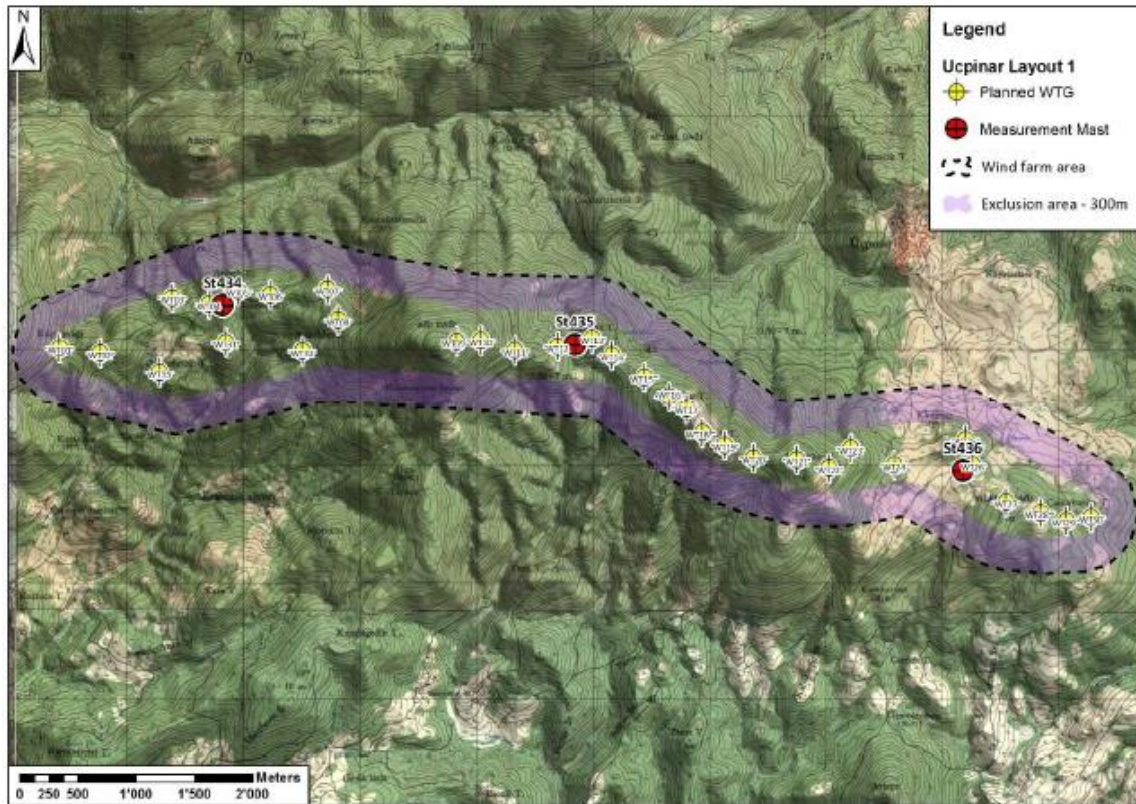


Figure 1: Location of the plant¹⁴

¹² Please see <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-10-v1.pdf>

¹³ Please see EPC agreement.

¹⁴ Please see energy Yield Assesment Report.

Table 2: Geographic coordinates of the project activity of Üçpınar WPP¹⁵

Wind Turbine No.	Latitude (N)	Longitude (E)
1	40° 08' 45.1824"	26° 37' 45.4110"
2	40° 08' 43.7676"	26° 38' 00.1718"
3	40° 08' 59.2908"	26° 38' 26.3783"
4	40° 08' 57.5160"	26° 38' 39.7017"
5	40° 09' 01.2780"	26° 38' 50.2911"
6	40° 09' 00.2412"	26° 39' 01.9621"
7	40° 09' 01.7964"	26° 39' 22.7919"
8	40° 08' 53.1456"	26° 39' 26.6395"
9	40° 08' 47.4000"	26° 40' 09.1445"
10	40° 08' 47.7168"	26° 40' 17.9340"
11	40° 08' 45.0276"	26° 40' 30.3304"
12	40° 08' 46.0752"	26° 40' 45.9211"
13	40° 08' 48.3504"	26° 40' 58.3363"
14	40° 08' 43.6992"	26° 41' 05.5428"
15	40° 08' 37.6008"	26° 41' 17.4892"
16	40° 08' 32.2080"	26° 41' 26.5157"
17	40° 08' 28.8204"	26° 41' 32.7858"
18	40° 08' 22.1532"	26° 41' 38.6478"
19	40° 08' 18.6396"	26° 41' 46.7775"
20	40° 08' 15.1296"	26° 41' 57.1889"
21	40° 08' 14.7840"	26° 42' 12.9531"
22	40° 08' 12.3792"	26° 42' 24.6692"
23	40° 08' 17.8476"	26° 42' 32.6751"
24	40° 08' 13.2828"	26° 42' 48.4994"
25	40° 08' 20.3496"	26° 43' 14.2907"
26	40° 08' 13.3836"	26° 43' 16.8970"
27	40° 08' 03.1956"	26° 43' 29.2355"
28	40° 08' 00.2112"	26° 43' 41.8400"
29	40° 07' 57.9612"	26° 43' 51.1876"
30	40° 07' 58.9224"	26° 44' 00.1000"
31	40° 08' 46.8636"	26° 38' 45.8011"
32	40° 08' 44.5452"	26° 39' 13.7920"
33	40° 08' 38.5512"	26° 38' 21.7541"

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.

¹⁵ Please see Production License for the coordinates and <https://coordinates-converter.com/en/decimal/47.375267,-109.638758?karte=OpenStreetMap&zoom=8> for the conversion.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The Project is in compliance with all required relevant regulations. There is no breach of any legislation and all types of required permits are already obtained.

Laws as relevant to the project are (Law No. and Publication Date in Official Gazette):

(1) Electricity Market Law (6446, 30/3/2013) ¹⁶

- This Law applies to electricity generation, transmission, distribution, wholesale, and retail sale, import and export, market operation as well as to the rights and obligations of all real and legal persons engaged in such activities. One of the terms in the implementation of this law is the connection agreement. Connection agreement means the agreement entered into for purposes of ensuring connection with the transmission system or distribution system of a generation company, distribution company or consumer. For the Üçpınar WPP, connection agreement documents have been provided. Also, Üçpınar WPP generated electricity within the framework of this law. In addition, to be specifically stated, Article 14 is about analyzed electricity generation. Taking into account all of these, this project in line with this law

(2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy (5346, 18/5/2005) ¹⁷

- Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy covers protection of renewable energy resource areas and principles and procedures for the use of these resources. Üçpınar WPP is using wind as a source and called renewable energy project. The project converts wind energy into electrical energy and the project activity generated electricity within the framework of this law. Additionally, Article 14-(3) generated that excess amount of electricity for analyzed electricity generation will be both in accordance with this law.

(3) Environment Law (2872, 11/8/1983) ¹⁸

- According to the relevant Environmental Impact Assessment Regulation for Üçpınar Wind 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. So, Environmental Impact Assessment is not required for this project and with legal entity.

(4) Occupational Health and Safety Regulation (6331, 30/6/2012) ¹⁹

- All necessary precautions and requirements are taken by the project owner in this project. Health and safety risks, emergency plans of the project have been considered by project developer both during construction and operation phases. Project developer identify the occupational health and safety measures to be taken as well as the protective gear or equipment to be used a consequence of the risk assessment. Healthy and safe working conditions for the employers with internal procedures and protective equipments have been provided by project developer in this project. Occupational safety measures taken in maintenance, repair and operation works are carried out and recorded according to the written procedure. Warning labels are provided before any

¹⁶ See: <http://www.lawsturkey.com/law/electricity-market-law-6446>

¹⁷ See: <https://www.mevzuat.gov.tr/MevzuatMetin/1.5.5346.pdf>

¹⁸ See <http://www.mevzuat.gov.tr/MevzuatMetin/1.5.2872.pdf>

¹⁹ See: <http://www.mevzuat.gov.tr/MevzuatMetin/1.5.6331.pdf>

maintenance and repair work. The maintenance and repairs of the plant and devices are performed periodically. Maintenance and repairs are recorded. Vehicles suitable for the land and road conditions, auto tires suitable for climate and nature conditions are used, and the maintenance of the vehicles is carried out periodically by the authorized service. So, this project in line with this law.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

The Project is owned by individual Derbent Enerji Üretim Pazarlama İthalat ve İhracat A.Ş.

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. Derbent Enerji Üretim Pazarlama İthalat ve İhracat A.Ş. does not obtain any public funding.

1.12.4 Participation under Other GHG Program

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

1.12.5 Projects Rejected by Other GHG Programs

Üçpınar WPP 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

“Üçpınar Wind Power Project, Turkey” is classified in the Renewable Energy Source category as electricity from non-fossil and non-depletable energy sources, in this case from wind, is fed into the Turkish electricity grid.

This is not a grouped project activity

Leakage Management

Not applicable.

Commercially Sensitive Information

Operational, investment and financial costs of the project are commercially sensitive information for the project proponent and this information was excluded from the public version of the project description.

Sustainable Development

As the project developer, **Üçpınar WPP** 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 wind 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. The benefits that will be gained by the realization of the project compared to the business-as-usual scenario can be summarized under four main indicators:

Environmental

The project activities will replace the grid electricity, which is constituted of different fuel sources causing greenhouse gas emissions. By replacing in the consumption of these fuels, it contributes to conservation of water, soil, flora and faunas and transfers these natural resources and also the additional supply of these primary energy sources to the future generations. In the absence of the project activity, an equivalent amount of electricity would have been generated from the power plants connected to the grid, majority of which are based on fossil fuels. Thus, the project is replacing the greenhouse gas emissions (CO₂, CH₄) and other pollutants (SO_x, NO_x, particulate matters) occurring from extraction, processing, transportation and burning of fossil-fuels for power generation connected to the national grid.

Economical

Firstly, the project will help to accelerate the growth of the wind power industry and stimulate the designation and production of renewable energy technologies in Turkey. Then, other entrepreneurs irrespective of sector will be encouraged to invest in wind power generations. It will also assist to reduce Turkey's increasing energy deficit and diversify the electricity generation mix while reducing import dependency, especially natural gas. Importantly, rural development will be maintained in the areas around the project site by providing infrastructural investments to these remote villages.

Social

Local employment will be enhanced by all project activities during construction and operation of the wind plant. As a result, local poverty and unemployment will be partially eliminated by increased job opportunities and project business activities. Construction materials for the foundations, cables and other auxiliary equipment will preferentially be sourced locally. Moreover as contribution of the project to welfare of the region, the quality of the electricity consumed in the region will be increased by local electricity production, which also contributes decreasing of distribution losses.

Technological

Implementation of the proposed project will contribute to wider deployment of wind power technology in local and national level. It will demonstrate the viability of larger grid connected wind power plants, which will support improved energy security, alternative sustainable energy, and also renewable energy industry development. This will also strengthen pillars of Turkish electricity supply based on ecologically sound technology.

Further Information

Not applicable.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

Title: Grid-connected electricity generation from renewable sources

Reference: ACM0002 (Version 19.0)

Version 19 of 'ACM0002: Large-scale Consolidated baseline methodology for grid-connected electricity generation from renewable sources' is applied as baseline and monitoring methodology to the project activity.

For the determination of the baseline, the official methodology ACM0002 version 19, "Large-scale Consolidated baseline methodology for grid-connected electricity generation from renewable sources"²⁰, is applied, using conservative options and data as presented in the following section.

This methodology refers to five tools, which are:

1. Tool to calculate the emission factor for an electricity system (Version 07.0)²¹;
2. Tool for the demonstration and assessment of additionality (Version 07.0.0)²²;
3. Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)²³;
4. Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 03.0)²⁴.
5. Tool to determine the remaining lifetime of the equipment (Version 01.)²⁵

The first tool (*Tool to calculate the emission factor for an electricity system (Version 07.0)*) is used for baseline calculation and second tool (*Tool for the demonstration and assessment of additionality (Version 07.0.0)*) is used for additionality assessment. As third tool (*Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)*) is the combination of the first and second tool, it is not used. Since no project emission or leakage calculation is required for wind power project, fourth tool (*Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 03.0)*) is not used. To determine the remaining lifetime of the equipment, fifth tool (*Tool to determine the remaining lifetime of the equipment (Version 01)*) is used.

2.2 Applicability of Methodology

Since the project has 99 MW installed capacity, large scale methodology ACM 0002 version 19 is used. The applicability criteria are described as follows;

Applicability Conditions in the ACM0002/Version19	Applicability to this project activity
This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant;	The project activity consists of installation of Greenfield power plant at a site where no renewable power plant was operated prior to the implementation of the project activity. Thus, it meets the said applicability condition.

²⁰ Please see ACM0002 Version 19: <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

²¹ Please see <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v7.0.pdf>

²² Please see <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v7.0.0.pdf>

²³ Please see <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-02-v7.0.pdf>

²⁴ Please see <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-03-v3.pdf>

²⁵ Please see <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-10-v1.pdf>

Applicability Conditions in the ACM0002/Version19	Applicability to this project activity
(b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	
The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The project activity is the installation of 33 wind turbine generators (WTGs). Hence, it meets this criterion.
In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	The project activity does not involve capacity additions, retrofits, rehabilitations or replacements. Hence, this criterion is not applicable to the project activity.
In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m²; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m²; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the	The project activity is not a hydro power plant. Hence, this criterion is not applicable to the project activity.

Applicability Conditions in the ACM0002/Version19	Applicability to this project activity
reservoirs, calculated using equation (3), is lower than or equal to 4 W/m², all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m²; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The project activity is not a hydro power plant. Hence, this criterion is not applicable to the project activity.
The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project	Project activity does not involve: • Switching from fossil fuels to renewable energy sources at the site of the project activity. • Biomass fired plants.

Applicability Conditions in the ACM0002/Version19	Applicability to this project activity
activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units	Hence, this criterion is not applicable.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.	The project is not a retrofit, rehabilitations, replacements or capacity addition; hence, this criterion is not applicable to the project activity.
In addition, the applicability conditions included in the tools referred to above apply.	Applicability conditions of the applied tool are justified.

2.3 Project Boundary

The project Üçpınar WPP uses wind energy to produce electricity. Kinetic power of the wind is converted to electrical energy, which then will be transferred to the grid. Back-up power generators in the wind farm will only be used when the wind farm is out of service and power cannot be supplied from grid. Hence, emissions due to usage of back-up power generation are expected to be very low and are taken to be zero complying with the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”(v.2).

Project boundary diagram is depicted in the diagram below:

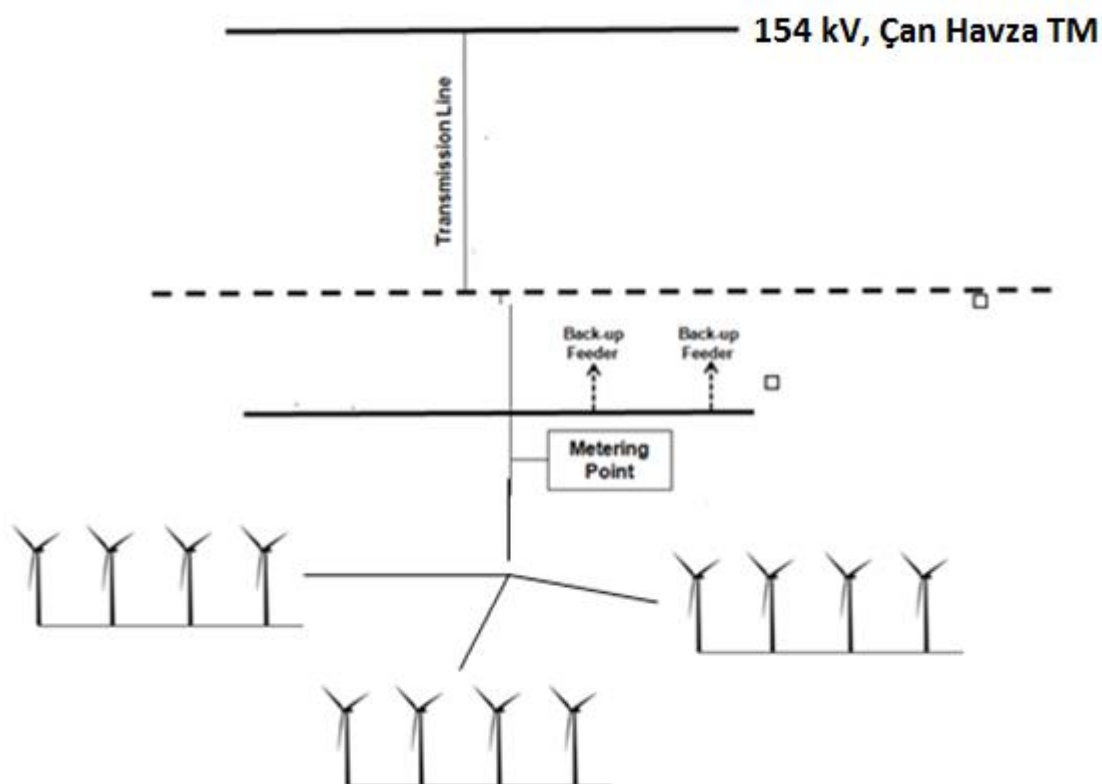


Figure 2: Project boundary diagram

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

Source		Gas	Included?	Justification/Explanation
Baseline Scenario	Grid	CO ₂	Yes	<i>Main emission source:</i> 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 ₂ O	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 ₂ O	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 large scale approved methodology ACM0002 (Version 19), “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 will 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 3** and **Figure 3** are examined, electricity demand is expected to exceed 420 billion kWh in 2027 with an average increase of 3.9%²⁶ 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.²⁷

Table 3: 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

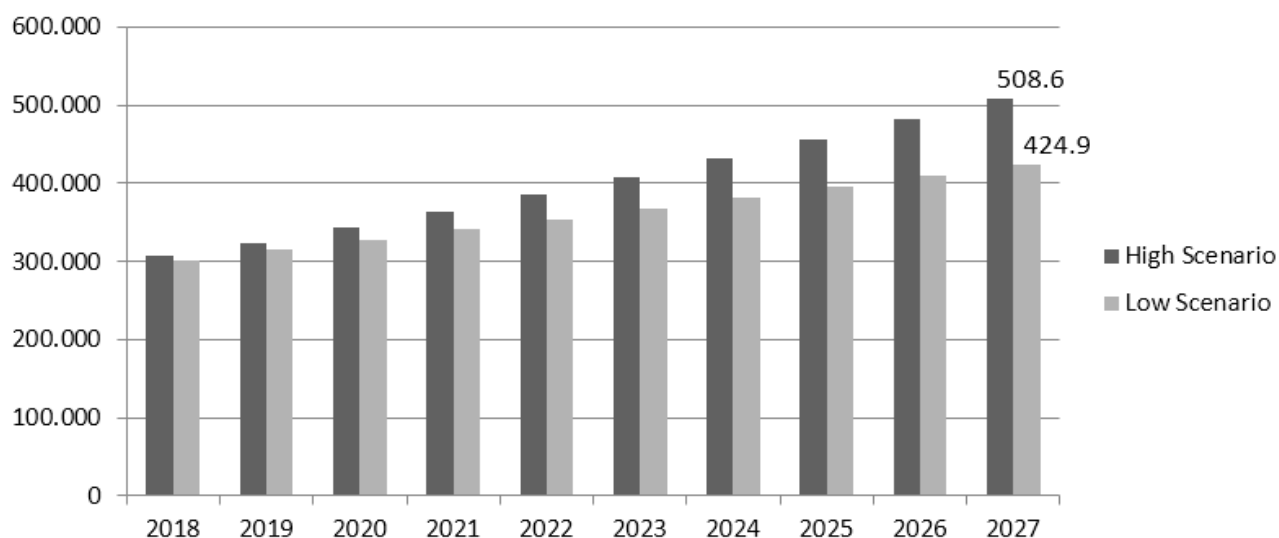


Figure 3: Electricity Demand Projections for Ten Years

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 4**:

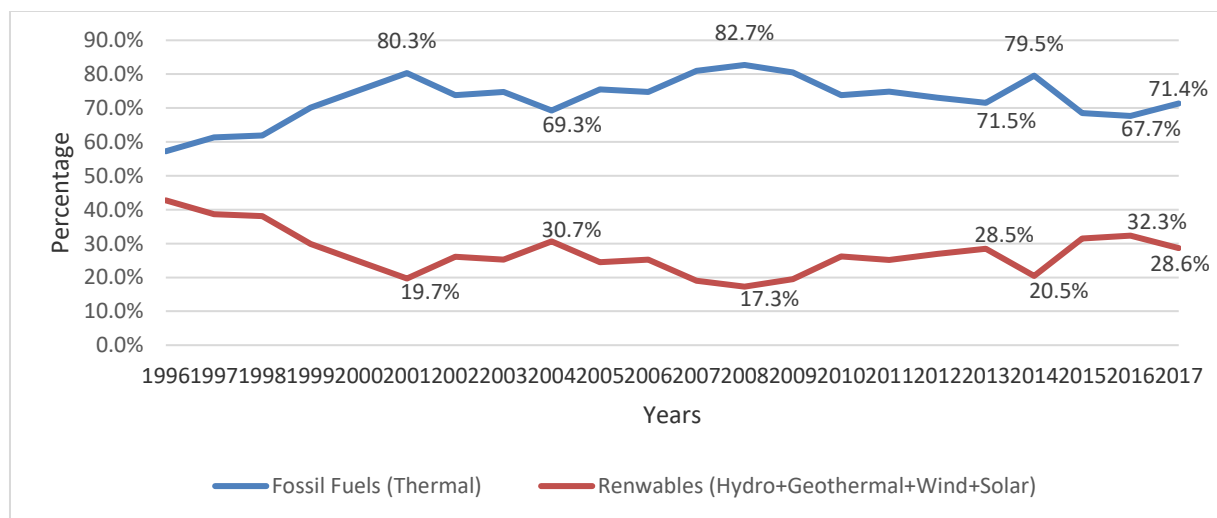
²⁶ Please see: <https://www.epdk.gov.tr/Detay/DownloadDocument?id=GTRjtj8aTa8=>

²⁷ Please see: <https://www.epdk.gov.tr/Detay/DownloadDocument?id=GTRjtj8aTa8=>

Table 4: Projection of Total Generation Capacity by Fuel Types (TWh)²⁸

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 E	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 4**.

**Figure 4: Fossil Fuels and Renewable in Turkish Electricity Mix (1996-2017)²⁹**

²⁸ Please see: <https://www.epdk.gov.tr/Detay/Icerik/3-0-66/elektrikuretim-kapasite-projeksiyonlari#>

²⁹ Please see: <https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri> or <https://webapi.teias.gov.tr/file/134559e1-09ad-4bdf-958c-da71e6d3ae6f?download>

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.³⁰ 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 Üçpınar WPP would not be built, power from a new grid-connected thermal plant would be the most likely scenario.

2.5 Additionality

For the explanation of how and why the project activity leads to emission reductions that are additional to what would have occurred in the absence of the project activity, the Baseline Methodology refers to the consolidated “Tool for the demonstration and assessment of additionality”³¹ version 7.0.0 (Tool), which defines a step-wise approach to be applied to the proposed project.

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

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

To identify the realistic and credible alternative scenario(s) for project participants, scenarios in the Tool are assessed:

a) The proposed project activity undertaken without being registered as a VCS VER project activity

This alternative is realistic and credible as Üçpınar WPP may undertake project activity if it sees no risk for project and/or if the project turns out to be financially attractive without VCS VER credit income. However, investments analysis shows that the project is not economically feasible without VCS VER credit income. Detail information is given in Step-3.

b) Other realistic and credible alternative scenario(s) to the proposed VCS VER project activity scenario that deliver electricity with comparable quality, properties and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology;

The project activity is power generation activity without any greenhouse gas emission harnessing the energy of the wind. Being a private entity, Üçpınar doesn't have to invest power investments even proposed project activity. Also, since Üçpınar has a license only for wind power investment and since in the proposed project area there is no hydro or other sources for electricity generation, other project activities delivering same electricity in the same project area is *not* realistic for project participant.

³⁰ Please see: <https://www.epdk.gov.tr/Detay/Icerik/3-0-66/elektrikuretim-kapasite-projeeksiyonlari#>

³¹ Version 7, <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf> (Page7)

c) Continuation of the current situation, i.e. Üçpınar WPP is not built

The decision in favor or against a project investment depends on the expected revenues and risks, like for every other private investment. Investment decisions other than Üçpınar WPP are independent from the question whether Üçpınar WPP is built or not. This alternative is also realistic and credible.

According to baseline scenario, which is described in B.4, there is a need for energy investment to satisfy increasing demand and if the Üçpınar WPP is not built, the same amount of energy will be supplied by other private investors to the grid. Forecasts shows that electricity supplied in the absence of Üçpınar WPP will be mainly based on fossil fuels as the projections for the year of 2022 forecasts 66.6% share for fossil fuels in the energy mix.

In the absence of the project the power will be produced by new and existing power plants in accordance with the baseline in ACM0002 version 19.

Outcome of Step 1.a: Therefore, two realistic and credible alternative scenarios are identified for the project activity:

- a) *The proposed project activity undertaken without being registered as a VCS VER project activity.*
- b) *Continuation of the current situation, i.e. Üçpınar WPP is not built.*

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

Both alternatives are (building or not building the project activity) in compliance with the following identified applicable mandatory laws and regulations:

- (1) Electricity Market Law³²
- (2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy³³
- (3) Environment Law³⁴

Table 5: Project Implementation Schedule

Date (DD/MM/YYYY)	Activity
02/03/2009	"EIA is not required" Certificate
29/09/2011	Issuance of the License
11/07/2014	Site Related Wind Potential Analysis and Energy Yield Assessment Report at the Üçpınar Site
19/03/2018	EPC agreement
19/03/2018	Turbine Maintenance Agreement
23/03/2018	Construction Start Date (Notice to Proceed for Execution of Works)
03/08/2018	Loan Agreement
10/08/2018	Facility Supplement Agreement
18/06/2019	Project start date, date which plant will start to generate electricity, start date of the first crediting period
17/06/2029	End of the first crediting period

³² See: <http://www.lawsturkey.com/law/electricity-market-law-6446>

³³ See: <https://www.mevzuat.gov.tr/MevzuatMetin/1.5.5346.pdf>

³⁴ See <http://www.mevzuat.gov.tr/MevzuatMetin/1.5.2872.pdf> (Enactment Date: 1983)

According to Turkish regulations, to get necessary permits for further project implementation, license issued by EMRA is required. Hence, issuance of license cannot be considered as 'Investment Decision Taken Date' but a prerequisite to proceed for further project development activities. EPC agreement date is set to be Investment Decision Taken Date (19/03/2018) from above implementation.

Aforementioned project implementation schedule shows us that Üçpınar WPP started to consideration of VER from the beginning of the project implementation and VER Revenue has decisive impact on decision of proceeding to the project.

In the following, the investment analysis is applied to clearly demonstrate that the project activity is unlikely to be financially/economically attractive without the revenue from the sale of VERs.

Outcome of Step 1.b: Üçpınar complies with mandatory laws and regulations. Project implementation schedule shows us that Üçpınar started to consideration of VER from the beginning of the project implementation and VER Revenue has decisive impact on decision of proceeding to the project.

Step 2. Investment analysis

"Tool 27: Investment Analysis³⁵" version 08.0 is taken into account when applying this step.

Applied tool: **"Tool for the demonstration and assessment of additionality version 7.0.0"**

Sub-step 2a: Determine Appropriate Analysis Method

Three options can be applied for the investment analysis: the simple cost analysis, the investment comparison analysis and the benchmark analysis.

- Option I: Simple cost analysis
- Option II: Investment comparison analysis
- Option III: Benchmark analysis

The simple cost analysis is not applicable for the proposed project because the project activity will have revenue (from electricity sales) other than CDM related income. The investment comparison analysis is also not applicable for the proposed project because the baseline scenario, providing the same annual electricity output by the Turkish National Grid, is not an investment project.

To conclude, the benchmark analysis will be used to identify whether the financial indicators (Equity IRR in this case) of the proposed project is better than relevant benchmark value.

³⁵ See, <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v8.pdf>

Sub-step 2b: Option III: Benchmark analysis

While applying the Benchmark Analysis, Option III, the Equity IRR is selected as the financial indicator for the demonstration of the additionality of the project as permitted in the additionality tool.

Benchmark rate is calculated in line with “Tool 27: Investment Analysis³⁶” version 08.0 which suggests the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or WACC are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate.

According to the “Tool for the demonstration and assessment of additionality” (v.7), benchmark can be derived from ‘Estimates of the cost of financing and required return on capital (e.g., commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds’. As a banker view, according to World Bank loan appraisal document³⁷, threshold equity IRR for wind power investments (i.e. required returns of equity for wind power plant investors) in Turkey is 15%. Therefore, 15.0% equity IRR is appropriate benchmark for the project activity and also additionality demonstration.

Assessment of likelihood conditions for each parameter to reach benchmark IRR is provided below:

Electricity Price

In order to reach 15.0% equity IRR benchmark, electricity price should increase more than 10% from assumed price (55.5 EUR/MWh). This feed-in-tariff price is already very high compared to general market price and not likely to increase. Thus, this 10.0% increase of the feed-in-tariff is not likely to happen. Even if electricity price will increase by 10%, equity IRR cannot reach up to 15.0%.

Investment Cost

In order to reach benchmark IRR, investment costs shall be decreased more than 10%. Since the equipment contract which has the higher share of the total costs is fixed, 10% decrease in the investment cost is unlikely. Thus, it is not likely for project activity to have threshold investment cost and reach to benchmark IRR. Even if investment cost will decrease by 10%, equity IRR cannot reach up to 15.0%.

Energy Yield

To have benchmark IRR, annual energy yield amount shall increase more than 10% more than base case electricity generation amount used in financial analysis. Although most of the wind power project uses p90 electricity generation amount from energy yield reports, to be conservative in financial investment analysis of the project activity p75 is used (317,500 MWh/yr). These figures are annual electricity generation to be sold except transmission loss. Using electricity generation amount in financial analysis, which have less than 10% probability of occurrence is not rational. Thus, it is not likely for project activity to generate threshold energy yield to reach benchmark IRR. Even if energy yield will increase by 10%, equity IRR cannot reach up to 15.0%.

Operation Cost

In order to reach benchmark IRR, annual operation decrease more than 10%. Such huge decrease in annual operation cost is not likely. Even if operation cost will decrease by 10%, equity IRR cannot reach up to 15.0%.

³⁶ Please See, <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v8.pdf>

³⁷ Please See, Worldbank - Project Appraisal Document on a IBRD Loan and a Proposed Loan from Clean Technology Fund to TSKB and TKB with the Guarantee of Turkey, June 2017

(<https://documents1.worldbank.org/curated/en/799701498842988254/pdf/ICR00004069-06192017.pdf> page 40, table 3.3. In order to access to the file, copy and paste the complete link to the web browser.)

Sub-step 2c: Calculation and comparison of the IRR

In the paragraph 12 of the ‘Guidance on the Assessment of Investment Analysis’³⁸ version 8, it is stated that:

“Required/expected returns on equity are appropriate benchmarks for equity IRR”. Since, benchmark identified in the Sub-step 2b *is required/expected returns on equity*, equity IRR (after tax) of the project activity shall be calculated for comparison.

Table 6: IRR inputs

Item	Value	Units	Source	Date of The Source Document
Installed Power	99	MWe	License of The project	29/09/2011
Technical lifetime of the project	25	years	Tool to determine the remaining lifetime of equipment (v.1) ³⁹	16/10/2009
Gross Generation	317,500	MWh	Üçpınar Wind Data Analysis and Energy Production Generation Assessment Report	11/07/2014
Electricity tariff	55.5	EUR Per MWh	Feed-in-tariff ⁴⁰	18/05/2005

Technical life time of the Üçpınar WPP is determined by using the ‘Tool to determine the remaining lifetime of equipment’ (v.1). In the tool it is said that default lifetime for the on-shore wind turbines is 25 years.

The equity IRR (after tax) of Üçpınar WPP is calculated on the basis of expected cash flows (investment, operating costs and revenues from electricity sale), as used in the financial analysis for the feasibility assessment of the project.

The parameters and values used for the IRR calculation are available to DOE during validation and also can be seen from the chart below.

FINANCIALS	
Equity Amount	Confidential
Loan Amount	Confidential
Interest Rate	7.50%
Repayment Period	13
Grace Period (years)	2
Notice to Proceed Date	23/03/2018
Power Plant Operation Start Date	18/06/2019
Investment Decision Date	19/03/2018
USD/TL	3.9362

³⁸ See, http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf (Page 3)

³⁹ See, <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf>

⁴⁰ For feed-in-tariff (5.5 Eur/kWh) see, <https://www.epdk.gov.tr/Detay/DownloadDocument?id=nTOEIt9RbvM=> the Law stating the electricity selling price is revised and the new law is : <https://www.epdk.gov.tr/Detay/Icerik/3-0-0-2256/kanunlar> However, the price has not been changed in the Law, so the 5.5 €/kWh, which is stated in the former Law is still valid. This explanation is also given with the footnotes in the IRR Excel and PD.

EUR/USD	1.228
EUR/TL	4.8335
Corporate Tax Rate	20%

The resulting IRR for 25 years is stated in below table.

Table 7: Equity IRR value for project activity (after tax)

Period	IRR
25 years	8.98%

The Benchmark is 15.0%, it does clearly exceed the resulting equity IRRs, thus rendering the project activity economically unattractive.

Sub-step 2d: Sensitivity analysis

While the main parameter determining the income of the project is the electricity sales revenue, investment cost and operation cost, a variation of the accordant values shall demonstrate the reliability of the IRR calculation. Key parameters are varied with +/-10%. The worst, base and best-case results for each parameter variation are given below, in **Table 8**.

The sensitivity analysis confirms that the proposed project activity is unlikely to be economically attractive without the revenues from VERs as even the maximum IRR result for the best case scenario (12.34%) is below the benchmark, which is 15.0%.

Table 8 : Equity IRR results according to different parameters

Parameter	Electricity Price			Investment Cost			Energy Yield			Operating Cost		
Variance	-10%	0%	10%	-10%	0%	10%	-10%	0%	10%	-10%	0%	10%
IRR	5.70%	8.98%	12.34%	12.30%	8.98%	6.86%	5.70%	8.98%	12.34%	10.89%	8.98%	6.90%

Step 3. Barrier analysis

The investment analysis has fully demonstrated and explained the additionality of the project, so step 3 is skipped.

Step 4: Common Practice Analysis

The section below provides the analysis as per step 4 of the “Tool for the demonstration and assessment of additionality”, version 7.0.0 and according to “Common Practice” Tool version 03.1⁴¹.

Step 1. Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity: The proposed project has a capacity of 99 MWe. Per the guideline of +/-50%, the applicable output range for the project is **49.5 MW to 148.5 MW**.

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; (Turkey)
- (b) The projects apply the same measure as the proposed project activity; (Renewable Energy Projects)
- (c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity; (Wind Power Plants)
- (d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant; (N.A.)
- (e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1; (49.5 MW to 148.5 MW)
- (f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity; (Project start date is used and it is 18/06/2019)

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

$N_{all} = 0$

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 N_{diff} .

$N_{diff} = 0$

Step 5: Calculate factor $F = 1 - N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

$$F = 1 - (N_{diff}/N_{all}) \\ = 1 - (0/0)$$

Therefore, factor F is undefined.

The proposed project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and $N_{all} - N_{diff}$ is greater than 3.

Although F is undefined, since $N_{all} - N_{diff}$ equals to 0, Üçpınar WPP is not common practice.

⁴¹ Please see <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-24-v1.pdf>

2.6 Methodology Deviations

There is no methodology deviation.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

The baseline for the project is no project, thus leading to generation in the relevant grid which is dominated by fossil fuel. 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 317,500 MWh of clean energy per annum.

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”(v6) (Tool)⁴² as indicated in ACM 0002.

Stepwise approach of „Tool to calculate the emission factor for an electricity system” version 06.0.0 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:

*“TEİAŞ 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 Center⁴³”.*

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 TEİAŞ, 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) tCO₂/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.⁴⁴Because 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:

⁴² Please see: <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf>

⁴³ Please see, <https://www.epdk.gov.tr/Detay/Icerik/3-6727/elektrik-piyasasi-lisans-yonetmeligi>

⁴⁴ Please see, <https://www.epdk.gov.tr/Detay/Icerik/3-0-66/elektrikuretim-kapasite-projeksiyonlari#>

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 CO₂ emissions per unit net electricity generation (tCO₂/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 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 9: Share of Low Cost Resource (LCR) Production 2013-2017 (Production in GWh)⁴⁵

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.

⁴⁵ Please see: <https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri> or <https://webapi.teias.gov.tr/file/cfd34f31-0bfd-4a06-8346-efb33285e44c?download>

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 CO₂ emissions per unit net electricity generation (tCO₂/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 and CO₂ 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:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \quad (1)$$

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)
$EF_{CO_2,i,y}$	=	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 CO₂ emission due to electricity generation in Turkey for the years of 2015, 2016 and 2017 are given in **Table 10**.

Table 10: CO₂ emissions from electricity production 2015-2017 (ktCO₂)

	2015	2016	2017
CO ₂ -Emissions	113,727	123,437	133,025

Table 11 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 CO₂ and thus are not taken into account in calculations.

Table 11: Gross electricity production by fossil energy sources 2015-2017 (GWh)⁴⁶

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 12: Net/gross electricity production 2015-2017 (GWh)⁴⁷

Relation Net/Gross Electricity Production 2015-2017			
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 13 shows the resulting net data for fossil fuel generation and adds electricity imports.

Table 13: 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) tCO₂/MWh.

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

⁴⁶ Please see: <https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri> or <https://webapi.teias.gov.tr/file/cfd34f31-0bfd-4a06-8346-efb33285e44c?download>

⁴⁷ Please see: <https://webapi.teias.gov.tr/file/a845c798-ca17-4e97-949b-33f618735ee4?download>

Table 14: Calculation of Weighted $EF_{grid,OMsimple,y}$ (ktCO₂/GWh)

	2015	2016	2017
CO ₂ -Emissions (ktCO ₂)	113,727	123,437	133,025
Net Electricity Supplied to Grid by relevant sources (GWh)	176,674.4	181,420.7	202,733.6
$EF_{grid,OMsimple,y}$ (ktCO ₂ /GWh)	0.6437	0.6804	0.6562
3-year Generation Weighted Average $EF_{grid,OMsimple,y}$ (ktCO ₂ /GWh)	0.6601		

$$EF_{grid,OMsimple,y} = 0.6601 \text{ (ktCO}_2\text{/GWh)}$$

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 be 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.⁴⁸

While determining the sample group, energy investments data from Ministry of Energy and Natural Sources website⁴⁹ 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

⁴⁸ Please see: http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ and Request for clarification on use of approved methodology AM0005 for several projects in China document.

⁴⁹ Please see: <https://enerji.gov.tr/enerji-isleri-genel-mudurlugu-yatirimlar>

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 (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

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

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:

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

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 15**. 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 15: $EF_{EL,m,y}$ calculation by using equation (3)

Fuels Used in Set Sample	Effective CO2 emission factor (tCO ₂ /GJ)	Average Efficiency ($\eta_{m,y}$)	$EF_{EL,m,y}$ (tCO ₂ /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 16** 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 16: 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

$$EF_{grid,BM,y} = 0.2900 \text{ tCO}_2/\text{MWh}$$

Step 6. Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) 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:

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

Where:

- $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh)
- $EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y (tCO₂/MWh)
- w_{OM} = Weighting of operating margin emissions factor (%)
- w_{BM} = Weighting of build margin emissions factor (%)

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

$$EF_{grid,CM,y} = 0.6601 \text{ tCO}_2/\text{MWh} * 0.75 + 0.2900 \text{ tCO}_2/\text{MWh} * 0.25 \\ = 0.5676$$

Emission reductions are calculated as follows:

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

Where:

- ER_y = Emission reductions in year y (t CO₂/yr).
- BE_y = Baseline emissions in year y (t CO₂/yr).
- PE_y = Project emissions in year y (t CO₂/yr).
- LE_y = Leakage emissions in year y (t CO₂/yr).

Project emissions

The proposed project activity involves the generation of electricity by development of a wind plant. The generation of electricity does not result in greenhouse gas emissions and therefore is taken as 0 tCO₂/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 CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

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

Where:

BE_y = Baseline emissions in year y (tCO₂/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 (v6)".

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 wind power plant. The generation of electricity does not result in greenhouse gas emissions and therefore is taken as 0 tCO₂/year.

3.3 Leakage

Leakage emissions in this project are considered to be negligible. There are no project emissions in this kind of project. 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: $ER_y = BE_y$

3.4 Net GHG Emission Reductions and Removals

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plant by renewable electricity. The emission reduction ER_y by the project activity during a given year y is the difference between Baseline emission and Project emission & Leakage emission. Emission reductions are calculated as follows:

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

Where:

ER_y = Emission reductions in year y (t CO₂/yr).

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

PE_y = Project emissions in year y (t CO₂/yr).

LE_y = Leakage emissions in year y (t CO₂/yr).

$$ER_y = BE_y = EG_y * EF_{grid,CM} = 317,500 \text{ MWh/year} * 0.5676 \text{ tCO}_2/\text{MWh} = 180,199 \text{ tCO}_2/\text{year}$$

Project emissions

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

Leakage

No leakage emissions are applicable.

Emission reductions

$$ER_y = ER_y = BE_y - PE_y - LE_y = 180,199 - 0 - 0$$

$$ER_y = 180,199 \text{ tCO}_2 \text{ (} ER_y = BE_y \text{)}$$

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
18.06.2019-31.12.2019	97,258	0	0	97,258
2020	180,199	0	0	180,199
2021	180,199	0	0	180,199
2022	180,199	0	0	180,199
2023	180,199	0	0	180,199
2024	180,199	0	0	180,199
2025	180,199	0	0	180,199
2026	180,199	0	0	180,199
2027	180,199	0	0	180,199
2028	180,199	0	0	180,199
01.01.2029-17.06.2029	82,941	0	0	82,941
Total	1,801,990	0	0	1,801,990

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 EG_y) in year y or hour h

Source of data	Turkish Electricity Transmission Company (TEİAŞ), Annual Development of Turkey's Gross Electricity Generation by Primary Energy Sources (2000-2017) TEİAŞ, see https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri or https://webapi.teias.gov.tr/file/cfd34f31-0bfd-4a06-8346-efb33285e44c?download
Value applied	See Table 13, Table 14, Table 15
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. Thus, for reliability, TEİAŞ 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 14). 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 15).
Purpose of Data	Data used for emission reduction calculation
Comments	

Data / Parameter	HVi,y
Data unit	Mass or volume unit
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://webapi.teias.gov.tr/file/780b9f4b-7e97-4e64-a264-20669a820b79?download
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://webapi.teias.gov.tr/file/780b9f4b-7e97-4e64-a264-20669a820b79?download
Value applied	See, Excel Table 8: Fossil Fuel Consumption Amounts
Justification of choice of data or description of	TEİAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey.

measurement methods and procedures applied	
Purpose of Data	Data used for emission reduction calculation
Comments	

Data / Parameter	NCV_{i,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 7: Heating Values of Fuels, Excel Table 8: Fossil Fuel Consumption Amount , 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	
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: https://enerji.gov.tr/eigm-raporlari
Value applied	See, Excel Table 11: 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	For determining sample group for BM calculation
Comments	

Data / Parameter	EF_{CO₂,i,y}
Data unit	tCO₂/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 10: Total CO ₂ Emission due to Fossil Fuels for Electricity Generation
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	
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: Sample Group for BM
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	
Comments	

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{m,y}$
Data unit	MWh
Description	Net quantity of electricity generated and delivered to the grid by power unit m in year y
Source of data	On site measurement from the meters.
Description of measurement methods and procedures to be applied	Two electricity meters will be placed (one main and one reserve) at the substation. These meters are sealed by TEIAS and intervention by project proponent is not possible. The fact that two meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is not only in the interest of the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyers. Main data source will be the PMUM data. TEİAŞ reciprocal agreement meter records will be used for cross checking.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording

Value applied	317,500 MWh/year
Monitoring equipment	Readings of the two electricity meters. Main data source will be the PMUM data. TEİAŞ reciprocal agreement meter records will be used for cross checking.
QA/QC procedures to be applied	According to the Article 2 of the Communiqué of Meters in Electricity Sector⁵⁰: ‘<i>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.</i>’ 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'⁵¹ (Regulation) of Ministry states that: ‘<i>b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years.</i>’ 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.
Purpose of data	Calculation of Baseline and Project Emission
Calculation method	-
Comments	Plant manager will be responsible for monitoring the 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 Üçpınar WPP. This value will be monitored continuously by redundant metering devices, one of them being the main one in the substation, which provides the data for the monthly invoicing to TEİAŞ.

Under data handling process, the meter is read remotely at the end of every month and published through website of TEİAŞ which can be accessed by project owner to check the correctness of the data. Besides,

⁵⁰ See, <https://www.epdk.gov.tr/Detay/Icerik/3-0-0-128/tebliqler>

⁵¹ See, <http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch=>

project owner carries monthly protocol to cross-check the data. By this way a cross check is done. Once the meter data is correct then the amount is also published in PMUM website which is also accessible by project owner. When all data is correct, an invoice (receipt of sale) is prepared by Üçpınar and delivered to TEİAŞ. The electricity generation amount, the collected data, are kept in both hardcopy and softcopy in daily and monthly basis indefinitely. Moreover, these data are submitted to several authorized people. Thus, several additional copies of these data are stored at different computers. The collected data during the monitoring period will be kept by the project owner at least two years after the last issuance of VCUs.

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. Meter is read by Üçpınar WPP staff 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.

The collected data will be kept by Üçpınar during the crediting period and until two years after the last issuance of VERs for the Üçpınar WPP 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.

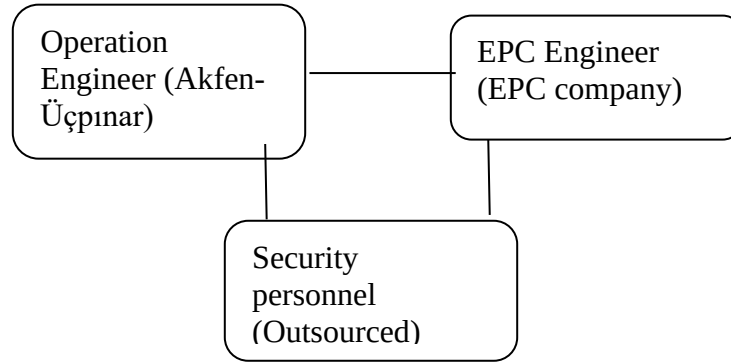
Potential leakage emissions in the context of power sector projects are emissions arising due to activities such as power plant construction, fuel handling and land inundation. However, according to the methodology, those emission sources do not need to be taken into account.

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 ($EG_{m,y}$) 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 Üçpınar and TEİAŞ. The settlement notification, which is issued by TEİAŞ and includes the meter reading data, is stored on a TEİAŞ file server and accessible for Üçpınar via a secured website. 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.

Üçpınar 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 VCS VCUs for Üçpınar WPP. Organizational structure is as follows:



The operation and maintenance of the wind farm will be conducted by Siemens company, while Akfen will be controlling the switches, during the first 10 years of the project. 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:

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Contributor: Derbent Enerji Üretim Pazarlama İthalat ve İhracat A.Ş.

Life Enerji is not a project participant.

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		Dust
Mitigation measure		Watering the roads and construction site regularly
Chosen parameter		Amount of dust emissions
Current situation of parameter		Roads and the construction site are watered regularly although it complies with related regulations even in the absence of watering ⁵² .
Estimation of baseline situation of parameter		Dust emission caused by the wind
Future target for parameter		Continuation of the current situation
Way of monitoring	How	Interview with the locals
	When	Once at the first verification
	By who	Project Proponent

⁵² Please see laboratory reports of dust

No	2	
Indicator	Water Quality and Quantity	
Mitigation measure	Storing the wastewater in a septic tank and will be transferred to waste water treatment plant.	
Chosen parameter	Amount of avoided wastewater discharged to the environment	
Current situation of parameter	No wastewater discharge to the environment in the project area.	
Estimation of baseline situation of parameter	No waste water 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

No	3	
Indicator	Noise	
Mitigation measure	Continuation of the construction in accordance to the limit values determined by the Regulations.	
Chosen parameter	Noise level around the project site	
Current situation of parameter	Avoidance of noise level exceeding the limit values determined by the Regulation, it complies with the related Regulation ⁵³	
Estimation of baseline situation of parameter	Noise level at the environment	
Future target for parameter	Continuation of the current situation	
Way of monitoring	How	Interview with the locals
	When	Once at the first verification
	By who	Project Proponent

No	4	
Indicator	Status of Roads	
Mitigation measure	Roads which are damaged will be fixed once the construction period is over	
Chosen parameter	Impact of project activity over roads	
Current situation of parameter	Status of the roads before the construction	
Estimation of baseline situation of parameter	Continuation of current situation	
Future target for parameter	Continuation of current situation	
Way of monitoring	How	Interview with locals
	When	Once during the first verification
	By who	Assigned technician by Plant Manager or assigned carbon consultant

No	5	
Indicator	Biodiversity	
Mitigation measure	a) Turbines will be painted to light colour	

⁵³ Please see noise measurement report.

		b) Ends of the wings of the turbines will be painted to a colour contrast to white. c) Lights will be put to the turbines. d) Employees will be briefed and informed about the protection of turtles and the natural importance of the field.
Chosen parameter		Number of bird strikes to the turbines and the adverse effects over the natural habitat
Current situation of parameter		Not applicable
Estimation of baseline situation of parameter		not applicable
Future target for parameter		zero
Way of monitoring	How	a,b,c) During the site visit DEO will report or proof with photographs d) During the verification site visit, PP will supply photos or videos or written attendance form of the briefing
	When	a,b,c, d) Once at the verification site visit
	By who	Assigned technician by Plant Manager or assigned carbon consultant.

No		6
Indicator		Livelihood of the Poor
Mitigation measure		Fair land compensation measures
Chosen parameter		Land acquisition
Current situation of parameter		Local land owners
Estimation of baseline situation of parameter		Continuation of current situation
Future target for parameter		Finalisation of the expropriation process
Way of monitoring	How	Interviews to check whether the process is carried out properly according to legal requirements and that land owners are compensated fairly.
	When	Once the first verification period
	By who	Assigned technician by Plant Manager or assigned carbon consultant.

5.2 Environmental Impact

According to the relevant Environmental Impact Assessment Regulation for Üçpınar WPP, 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 process⁵⁴.

⁵⁴ Please see EIA not required document

5.3 Local Stakeholder Consultation

Stakeholder engagement procedure was conducted at the Üçpınar Village with the village head and the local stakeholders on 31/07/2018.

As validated during the site visit, although the general outcome of the discussions with the local people is positive verbally, the project owner will regularly follow up with the local people whether they have any problems or requests. Also logbook is available for comments of local stakeholders. What's more, thanks to the Grievance Mechanism, local stakeholders will have a chance to submit their requests and complaints to the project owner about the project. In addition, muhtar (head of the village) had already taken the contact information (e.g mobile phone) of public relationships expert, project manager and assistant general director of the company so that the local stakeholders will be able to reach these people whenever they have any complaints, suggestions or ideas about the project. They will be able to communicate with them in case of any problems.

Since muhtar is the head of the village, he 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.

5.4 Public Comments

According to VCS Rules⁵⁵, 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 26 June 2019⁵⁶. Therefore 30-day comment period is completed on 26 July 2019.

The participants were provided information about ongoing activities of the project and let them to provide their comments. During this time (26 June 2019 to 26 July 2019) No negative feedbacks were received from the villagers.

⁵⁵ VCS Standard v3.7, 3.17.5:8 (https://verra.org/wp-content/uploads/2018/03/VCS_Standard_v3.7.pdf)

⁵⁶ Ref: https://www.vcsprojectdatabase.org/#/pipeline_details/PL1907

APPENDIX 1: Contact Information of Project Participants

Organization name	Derbent Enerji Üretim Pazarlama İthalat İhracat A.Ş.
Registration number with relevant authority	
Street/P.O. Box	Turan Güneş Bulvarı Galip Erdem Cad. No: 3 Çankaya/ANKARA
Building	
City	Ankara
State/Region	
Postcode	
Country	Turkey
Telephone	
Fax	
E-mail	
Website	
Contact person	Melis Ünal
Title	Electrical Works Specialist
Salutation	Ms.
Last name	Ünal
Middle name	
First name	Melis
Department	
Mobile	
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