FSTEP 3

Project design document form for CDM project activities

(Version 06.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	CANTA WPP
Version number of the PDD	07
Completion date of the PDD	01/08/2019
Project participant(s)	Boydak Enerji Üretim ve Ticaret Anonim (Project Owner) GTE Carbon (Project Developer)
Host Party	TURKEY
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral scope 1: Energy Industries (Renewable-/non-renewable sources) Methodology: ACM0002 "Grid-connected electricity generation from renewable sources ", version 13. 0
Estimated amount of annual average GHG emission reductions	96,072 tonnes CO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The proposed project is a large scale wind power plant project located within the boundaries of Silivri District of Istanbul province. The project is licensed on 18/08/2011 as 45MWe and completed as 45MWe/47.5 MWm. In 27/08/2015, license has been upgraded to 50MWe/54.7MWm by Energy Market Regulatory Authority (EMRA). Purpose of the proposed project is to generate electricity by utilizing the renewable energy potential to meet increasing electricity demand and thus reduce fossil fuel consumption.

The initial phase of the proposed project involves installation of 19 turbines each having 2.5 MW capacity (Total capacity is 47.5 MWm and 45MWe). Total output capacity ise 163.2 GWh.After expansion, number of turbines will be 21 and expected output will be 175 GWh. Turbine output is transmitted to the switchyard area via underground cabling. Total land used for the project is estimated as 1,900 m2 for turbines, 350m2 for office and facility buildings and about 150m2 for switchyard area[1]. Electricity generated at project is fed to the national grid via Silivri substation. Length of transmission line is around 11.5 km[2].

Final project layout includes 19 ×2.5MWe Nordex N100/2500kW R100 turbines and 2×3.6MMWm/1.25 MWe turbines which results in 175 GWh annual generation. Estimated generation corresponds to 96,072 tCO2 avoided annually. Average lifetime of turbines are assumed as 25 years as per the tool applied[3].

Main goals of the Proposed Projects include;

- Utilization of the renewable energy potential of Turkey in order to meet rapidly increasing electricity demand and contribute achieving energy security.
- Increase share of WPPs in electricity generation mix of Turkey and reduction of GHG emissions.
- Contribute to the national economic development by creating direct and indirect job opportunities during construction and operation phases.
- Reduce import dependency of fossil fuel dominated electricity sector and diversify generation mix through use of local resources.
- Contribution to sustainable development through supporting local community and local economy.

Project not only contributes to emission reduction through use of renewable resources and creating job opportunities and thus contribute sustainable development. In terms of environmental impact, project is considered to have positive impact on air quality due to avoided NOx, PM and SO2 emissions whereas no negative impact on water quality other pollutants and biodiversity has been identified. As per the national regulations, a project introductory file (PIF) has been prepared for the project to assess the environmental impacts. In addition to national requirements, an Environmental and Social Action Plan (ESAP), Non-Technical Summary of the Project, Gap Analysis Report and Stakeholder Engagement Plan have been prepared for the project for compliance with international standards.

According to the research conducted by State Planning Organization (SPO) on socio-economic level of Districts in Turkey, Silivri District is ranked as 60th among 872 Districts in Turkey in terms of development level and classified in second (out of six) group. About 46.6% of the population works on agriculture and 37.5% works on service sector whereas 15.9% works on industry[4]. Despite the high percentage of population working in industry, unemployment is still high due to high population increase (33.19%) in Silivri mainly due to migration from rural areas.

In addition to contribution to local economy, project also contributes use of local and renewable resources to meet the increasing energy demand of Turkey and reduce dependency on fossil fuels. According to Turkish Electricity Transmission Company (TEIAS) statistic, in 2011 about 74.8%[5] of the electricity has been generated via thermal power plants whereas 45.4% was from natural gas (NG) power plants which is fully imported and

[1] CANTA WPP PRE-EIA Report page 15
[2] Grid Connection Agreement
[3] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf
[4] http://www.dpt.gov.tr/DocObjects/Download/3159/ilce.pdf (Page 174)
[5] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/44.xls

21.6 bn m3 NG has been consumed[6]. In terms of fuel dependency, proposed project is expected to replace about NG and other fossil fuel import and consumption and thus contribute to balance of payments and increase air quality.

Milestone	Date
Preliminary EIA	January 2009
EIA Decision	13/02/2009
License Issuance	18/08/2011
Board Decision	01/11/2011
Carbon Certification Agreement	01/01/2012
EM Equipment Purchase Contract*	26/03/2012
LSC Meeting	16/04/2012
License Revision	18/04/2012
Bankable Report	13/06/2012
Forest Permission	25/06/2012
Grid Connection Agreement	03/10/2012
Loan Proposal	21/10/2012
Construction Start Date[7]	01/03/2013
Agreement on construction of transmission line, wind park, assembly and test operation (ABB)	13/09/2013
Subcontractor Agreement for Substation Construction (Bilmer)	22/02/2013
Subcontractor Agreement for basement and Construction (Bilmer)	22/02/2013
Commissioning Date	24/07/2014
Capacity Extension License Approval	27/08/2015

Table 1. Milestones for Canta WPP

*Date of investment decision

As it can be seen from the Table above, the Board took a decision on 01/11/2011 to integrate into carbon revenues into the project financial feasibility. In line with the CDM-EB-41[8], investment decision date has been selected as the equipment purchase contract as it is dated as the earliest contract indicating a concrete proof of the project owners realisation of the project.

The load factor of the project is calculated as 39%[9] based on the Bankable Report of the project fort he initial phase of the project.

The project area consists of private land and Treasury land used as meadow and agricultural land, and, besides unused land.

A.2. Location of project activity

A.2.1. Host Party

Host country is Turkey. Although Turkey, the host Country, passed legislation in Parliament on 05/02/2009 to ratify the Kyoto Protocol - Turkey does not have a quantitative emission reduction limit yet and it is likely that it will not have a quantitative emission reduction limit. In terms of Kyoto Protocol's 2nd commitment period, Turkey has not yet ratified the Amendment. Furthermore, Turkey does not have a quantitative emission reduction in the amended Kyoto Protocol. As such, Turkey's

[6] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls
[7] Çanta WPP, Land Delivery Record
[8] http://cdm.unfccc.int/EB/041/eb41rep.pdf
[9] Calculation provided in the Financial Analysis Excel.

participation in the carbon emission reduction will be a voluntary basis.

A.2.2. Region/State/Province etc.

Project is located within boundaries of Silivri District of İstanbul Province of Turkey.

A.2.3. City/Town/Community etc.

Nearest settlement to the project boundaries is Canta village which is about 650 m from the project nearest türbine.

A.2.4. Physical/Geographical location

Zone(35S)	Y	X	Zone(35S)	Y	X
T1	588962.66	4551829.82	T11	587786.26	4554771.83
T2	589777.07	4552521.47	T12	588329.00	4553037.87
T3	588300.79	4555674.25	T13	588008.00	4554405.00
T4	589467.97	4552896.92	T14	587605.00	4555205.00
T5	589203.81	4553173.74	T15	588444.80	4555276.18
T6	588751.61	4553173.50	T16	588649.29	4551930.17
T7	589008.37	4553837.01	T17	588308.91	4551986.34
T8	589221.71	4554592.04	T18	589425.02	4551827.16
T9	588982.15	4554889.46	T19	589885.99	4551989.56
T10	588578.19	4553777.76	Switchyard	589572.25	4553327.41
T20*	589375.00	4552292.00	T21*	587774.00	4553622.00

Table 2. Coordinated of the Turbines (* for new turbines)

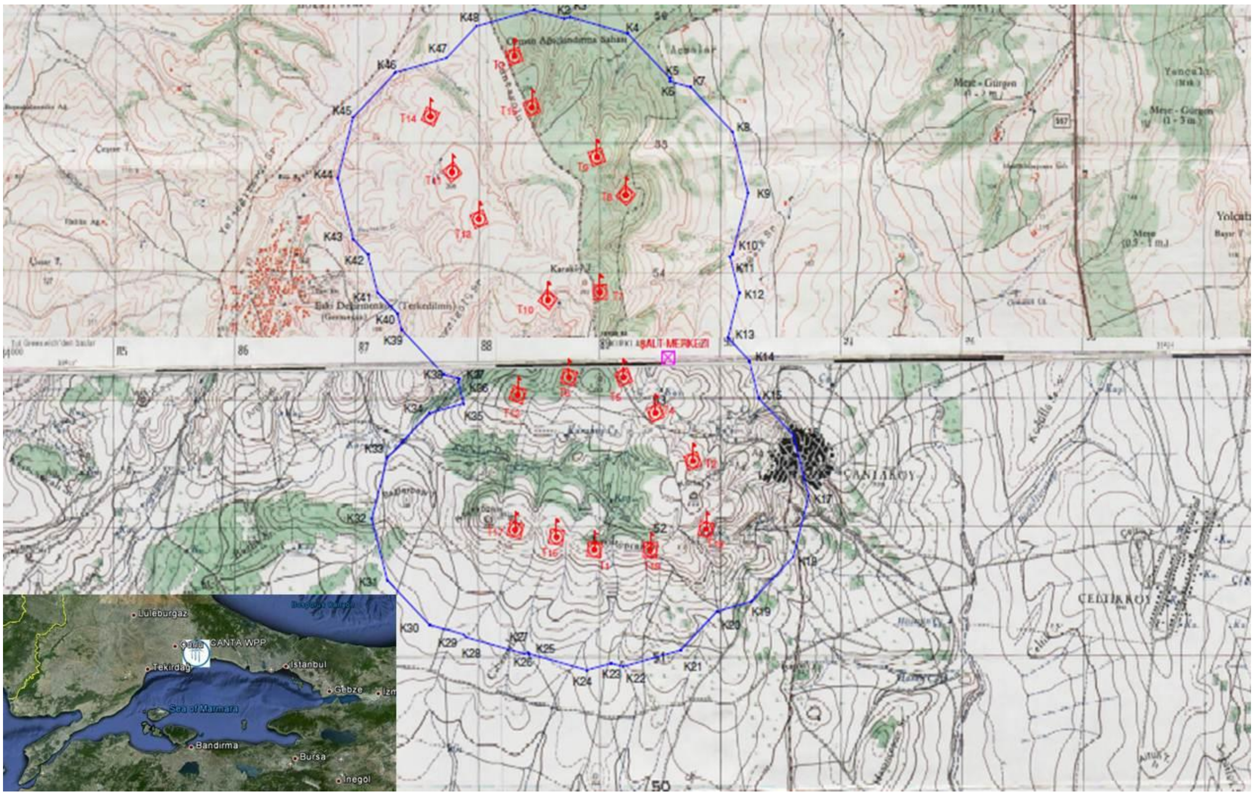


Figure 1. Layout of Turbines

A.3. Technologies and/or measures

Wind Power Plants use wind energy converters (WEC), called wind turbines to convert the wind energy into electrical energy. The project uses 19 WEC's of Nordex N100/2500kW R100 MW and two 3.6 MWm/1.25 MWe turbines. Mechanical capacity will be 54.7 MWm however electrical output is limited to 50 MWe. The annual electricity generation from these turbines are estimated to be 175 GWh. This energy is converted at the site switchyard and fed to the national grid.

	N100/2500 kW
Rotor	
Number of blades	3
Rotor speed	9.6 – 14.9 rpm
Rotor diameter	99.8 m
Swept area	7,823 m^2
Power regulation	Pitch
Cut-in wind speed	3 m/s
Cut-out wind speed	20 m/s
Rated output at	12.5 m/s
Survival wind speed	52.5 m/s
Pitchregulation	Individual blade pitch
Weight	Approx. 56,500 kg
Blades	
Blade length	48.7 m
Material	GRP
Weight	Approx. 9,800 kg
Gearbox	
Type	Planetary/spur gear or differential gear box
Gear ratio	1:77.4 (50 Hz)/1:92.9 (60 Hz)
Generator	
Power	2,500 kW
Voltage	660 V
Type	Double-fed asynchronous generator with partial frequency converter
Frequency	50 or 60 Hz

	N100/2500 kW
Yaw system	
Yaw bearing	Ball bearing
Brake	Hydraulic, disc brake
Yaw drive	Asynchronous motors with integrated brakes
Speed	Approx. 0,4 deg/s
Control system	
Type	SPS, Remote Field Controller (RFC)
Grid connection	Via IGBT converter
Scope of monitoring	Remote monitoring of over 300 different parameters, e.g. temperature, hydraulic pressure, pitch parameters, wind speed and direction
Recording	Production data, event lists with filter function, long and short-term trends
Visualisation	Panel PC in control cabinet and Web-based access possible from any PC, adapter for laptop at the bottom of tower or in nacelle
Brakes	
Design	Three independent brake systems (single pitch)
Aerodynamic	Individual pitching of blades
Mechanical	Disc brake
Tower	
Type	Modular, steel tube tower
Hub height	100 m, certificate DiBt 2, IEC 3a

Table 3. Characteristics of the turbine used.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey	Boydak Enerji Üretim ve Ticaret Anonim Şirketi (Boydak).- (Project Owner-Private Entity)	No

A.5. Public funding of project activity

No public funding is used for the project.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

The UNFCCC approved baseline and monitoring methodology ACM0002, version 13.0.0[10] valid from 11/05/2012 was applied for the project activity.

ACM0002 refers to the following tools:

- "Tool for the demonstration and assessment of additionality", Version 07.0.0[11],and,
- ''Tool to calculate the emission factor for an electricity system'', Version 3.0[12]

"Tool for the demonstration and assessment of additionality", is used as it is an imperative by the methodology which is not new.

''Tool to calculate the emission factor for an electricity system'' is applied:

- to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid

the emission factor for the project electricity system is calculated for grid power plants only

B.2. Applicability of methodology and standardized baseline

The project activity qualifies as a large-scale activity. The capacity of the project activity is 50 MWe (54.7 MWm) which is above the small scale limit. Project is a Type I activity and complies with eligibility rules during the full crediting period.

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

- The proposed project activity is a greenfield, grid connected renewable electricity generation project,
- The project activity is the installation of wind power plant
- The project does not involve capacity addition, a retrofit of (an) existing plant(s) or a replacement of (an) existing plant(s)Project activity does not involve switching from fossil fuels to renewable energy sources at the site of project activity
- The project does not involve combined heat and power generation activity
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

Since there exists no delineation of project electricity system or connected electricity systems by DNA, following criteria has been used to determine the existence of significant transmission constraints:

- In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 percent between the systems during 60 percent or more of the hours of the year.
- The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

Since the project output is fed to the Turkish electricity grid which does not involve any distinct electricity systems that applies different price, first criteria defined above is not applicable. Also, since the transmission line between the proposed projects and nearest substation is built within the scope of the project and there exist no information on grid capacity utilization, second criteria

10 http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT
11 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf/history_view
12 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v3.0.0.pdf/history_view

is also inapplicable. Based on assessment above, it is difficult to conclude with a significant transmission constraint or grid boundary. Since there is no dispatch grid system in Turkey, the project boundary is considered as the National Electricity Grid of Turkey according to applied tool. The geographical and physical boundaries of the Turkish grid and location of the power plants are well identified as given diagram below.

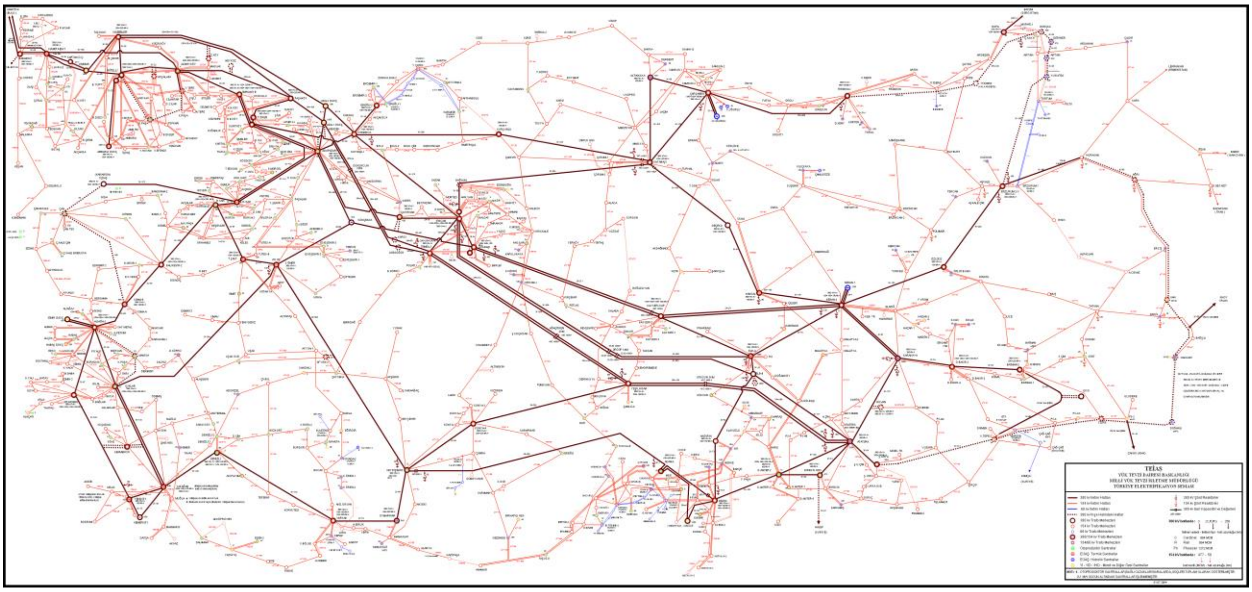
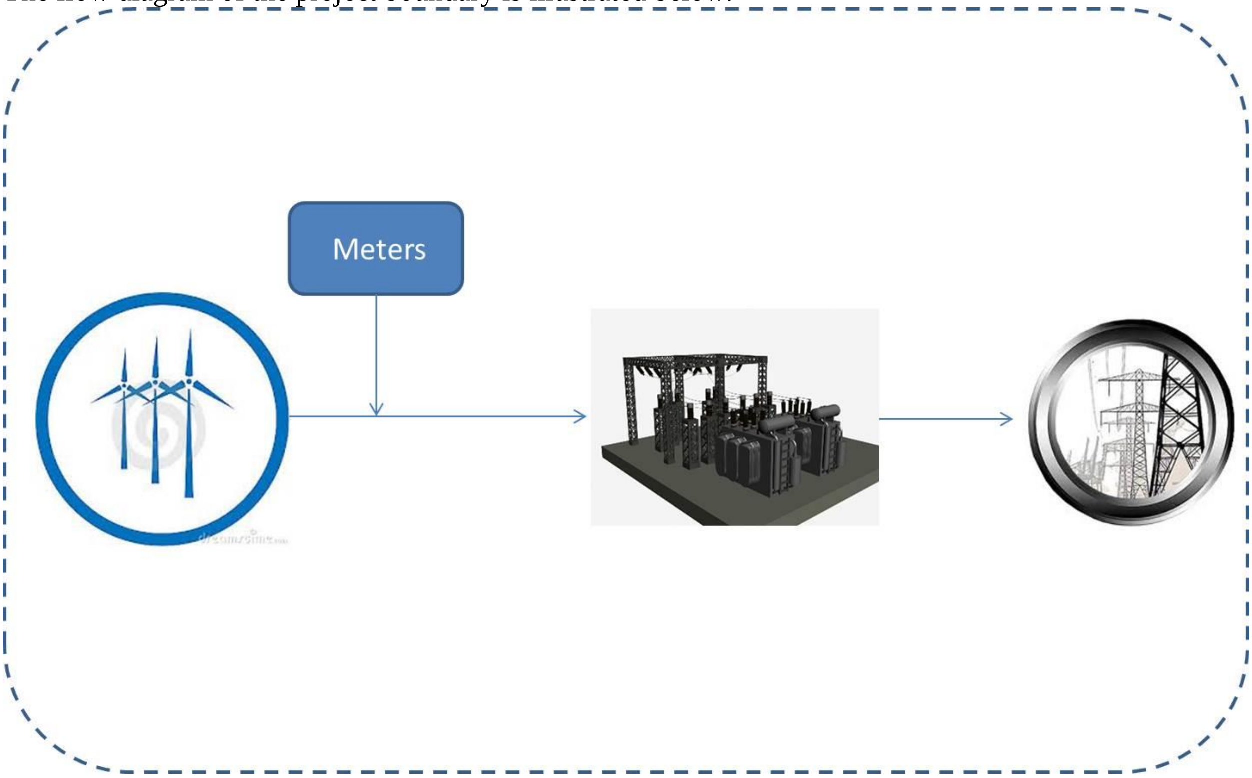


Figure 2. Turkish Electricity Grid

B.3. Project boundary

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

The flow diagram of the project boundary is illustrated below:



Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Electricity Generation by the grid connected power plants	CO_2	Yes	Major emission Source
		CH_4	No	Minor emission Source. Excluded for simplification
		N_2O	No	Minor emission Source. Excluded for simplification
Project scenario	Project Scenario	CO_2	No	Zero emission electricity generation from renewable resources. Emissions from diesel generator are excluded for simplification as it is a minor emission source.
		CH_4	No	Zero emission electricity generation from renewable resources.
		N_2O	No	Zero emission electricity generation from renewable resources.

B.4. Establishment and description of baseline scenario

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

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

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

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

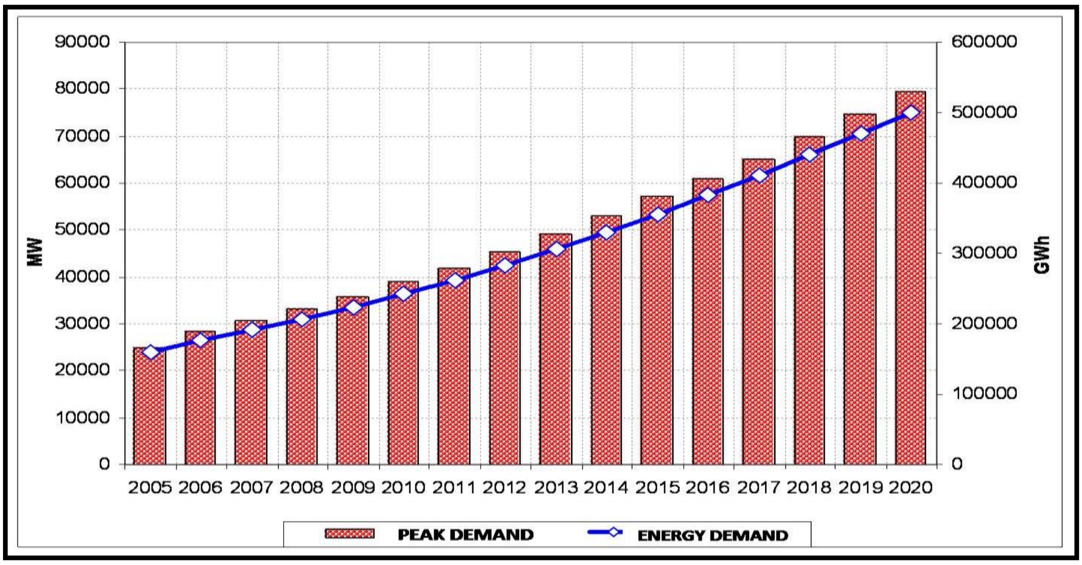


Figure 3. Peak Load and consumption projection for Turkish electricity system between 2005-2020[13]

According to the TEIAS statistics[14], share of WPPs together with geothermal power plants could hardly reach 1.68% in 2010 whereas share of thermal power plants is around 74-80% in recent years. When we look at the annual development of Turkey's gross generation in recent years we see that grid is dominated by thermal power plants and which is boosted by increasing energy demand in parallel to increase population and per capita income. Hence, baseline of Turkey's electricity grid will continue to be dominated by fossil fuel power plants which is seen as the quickest solution in short term to meet the demand and enable energy security in supply side.

13 http://www.teias.gov.tr/apkuretimplani/veriler.htm

14 http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/36.xls

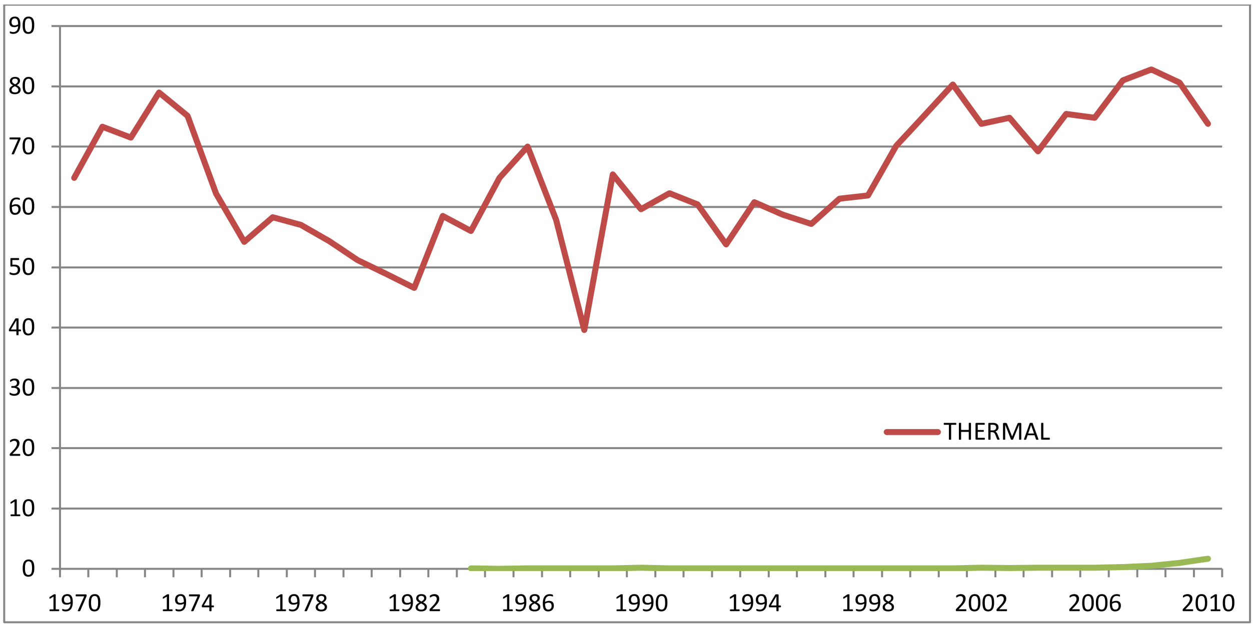


Figure 4. Annual Development of Turkey's Gross Generation Capacity[14]

B.5. Demonstration of additionality

"Tool for the demonstration and assessment of additionality", Version 07.0.0[15] is utilized as per the methodology.

According to the applied methodology (ACM0002) the baseline scenario for the project has been defined as "generation of equal amount of electricity by the power plants connected to the grid". Emission factor for the baseline scenario has been calculated according to the combined margin approach as defined by the selected methodology. Within this framework, the project is expected to generate about 175 GWh electricity and reduce about 96,072 tCO_2 emissions through replacing the electricity that would need to be supplied via the National grid in the absence of the project activity. Additionality of the proposed project has been assessed according to the applied tool for demonstration of additionality as shown in following steps.

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

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

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

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

The first alternative, which is the implementation of the project without carbon revenue is not financially attractive as discussed in investment analysis section below. The Second alternative (Scenario 2) is the baseline scenario and implementation of the proposed project as a VER activity would be additional to this scenario.

Outcome of Step 1a

Continuation of the current situation is not considered as a realistic alternative due to increasing electricity demand therefore new power plants should be constructed which includes mainly

[15] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf/history_view

thermal power plants. Implementation of the project is additional to the baseline scenario which is alternative 2 above and therefore reduces the emissions.

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

The following applicable mandatory laws and regulations have been identified:

1. Electricity Market Law[16]
2. Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[17]
3. Energy Efficiency Law [18]
4. Forest Law[19]
5. Environment Law[20]

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

Outcome of Step 1b

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

Step 2 - Investment analysis

The investment analysis has been done in order to make an economic and financial evaluation of the project. No public funding or ODA are available in Turkey for finance of this type of projects. A preliminary loan agreement has been signed for the project activity. However, the project construction was completed based on 100% equity, thus, the project IRR is considered equal to the equity IRR for the financial analysis .

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

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

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

Since Project generates economic benefits from sales of electricity, the simple cost analysis is not applicable. Also, since the baseline of the project is generation of electricity by the grid, no alternative investment is considered at issue. So, it has been decided to use benchmark analysis for evaluation of the project investment. A preliminary loan agreement has been signed for the project activity. However, the project construction was completed based on 100% equity, thus, the project IRR is considered equal to the equity IRR for the financial analysis.

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

For benchmark analysis, figure defined by World Bank for similar project types have been used

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16 Law number 4628, enactment date 03/03/2001 http://www.epdk.gov.tr/english/regulations/electricity.htm

17 Law number 5346, enactment date 18/05/2005 http://www.epdk.gov.tr/documents/10157/4b360128-53aa-4174-8104-a6c10434ac9c

18 Law number 5627, enactment date 02/05/2007 http://www.eie.gov.tr/english/announcements/EV_kanunu/EnVer_kanunu_tercume_revize2707.doc

19 Law number 6831, enactment date 31/08/1956

20 Law number 2872. Published in official gazette No. 18132 on 11/08/’83

which has been given as 15% [21] by a report generated in May 2009. For the proposed project, in order to reach this project IRR values, average electricity tariff must be above 12 $c/kWh in the absence of carbon revenue and assuming that initial investment figures are realized so that the investment becomes reasonable.

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

Parameters	Unit	Data Value
Installed Capacity	(MWm) MWe	(54.7) 50.0[22]
Grid Connected Output	GWh	163.2[22] (175*)
Capital Investment	Million $	97.6[23] (113.4*)
Income tax rate	%	20[24]
Depreciation	Years	25 for electromechanical equipment 40 for other facilities[25]
Exchange rate	€ / $	1.32[26]
Expected Tariff	$ Cents/kWh	7.3[27]
Expected VERs price	$/ tons CO_2e	6.5[28]
Operation&Maintenance Cost	$/Year	1,555[29]

Table 4. Main financial parameters used for investment analysis

(*capcity extension)

Equity IRR has been calculated according to the tool as stated in the applied methodology and *CDM-EB73-A08 Clarification Version 01.0,* for 20 years, where says *"if project participants choose a renewable crediting period and if the technical lifetime of the CDM project activity is more than 20 years, the investment analysis shall be conducted for 20 years and include the fair value of the project activity assets at the end of the assessment period.".* Electricity tariff has been used as $7.3 Cent/kWh. Annual generation has been taken as 175 GWh after extension and maintenance cost has been estimated as $1,555 which is assumed to be same after extension.. Investment decision date has been identified as the date of equipment purchase agreement. For depreciation calculations, expected life of construction and electromechanical equipment are determined as 40 year and 25 year, respectively.[30] Calculation and estimations have been made conservatively therefore project IRR value represents the most optimistic scenario in terms of capital investment and electricity generation. On the other hand electricity tariff is expected to increase so that the investment becomes attractive however as given below, expectations have not been realized yet due to the market conditions.

For proposed project, project IRR has been calculated as 6.19% after extension in the absence of carbon revenue for license period and ignoring expropriation etc cost. The project does not use

21 http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/05/11/000333037_20090511030724/Rendered/PDF/468080PAD0P112101Official0Use0Only1.pdf , page 81

22 Generation License

23 Çanta WPP Cash Flow

24 http://www.istanbulymmo.org.tr/_dosya/MaliPlatform/30.%205520%20sayili%20kurumlsr%20vergisi%20kanunu%20ac%C4%B1klamalari.pdf, page 6

25 http://www.gib.gov.tr/fileadmin/mevzuatek/eski/verusulteb333ek.html

26 http://www.tcmb.gov.tr/

27 Law on the Utilization Renewable Energy Sources to Generate Electricity, http://www.enerji.gov.tr/mevzuat/5346/5346_Sayili_Yenilenebilir_Enerji_Kaynaklarinin_Elektrik_Enerjisi_Uretimi_Amacli_Kullanimina_Iliskin_Kanun.pdf, available at (**I Sayılı Cetvel)**

28 Tulletprebon newsletter

29 Çanta WPP Cash Flow

30 http://www.gib.gov.tr/fileadmin/mevzuatek/eski/verusulteb333ek.html

any credits and use solely equity. When we include the carbon revenue in the cash flow, project IRR increases to 6.82% and the project becomes more attractive and viable for the investors as coupled with the view that energy sale prices that can be achieved from the project is likely to increase in future years. Expectation that the electricity prices will increase is the risk for investors whereas realization of this expectation will the premium. Carbon revenue has a significant affect in this respect in terms of decreasing the period for return on investment and risk of investment decision.

Following figure is given in order to reflect the actual electricity prices realized obtained from monthly reports of Market Settling and Balancing Center[31] between 01/12/2009-01/01/2012. It should be considered that these prices are highest prices obtained and power plants which sell electricity through bilateral agreements have lower income. Figure shows that the actual prices have even been lower than guaranteed price in some cases therefore assumption of 7.3 $cents per kWh (or 73 $/MWh) is a realistic scenario as demonstrated below.

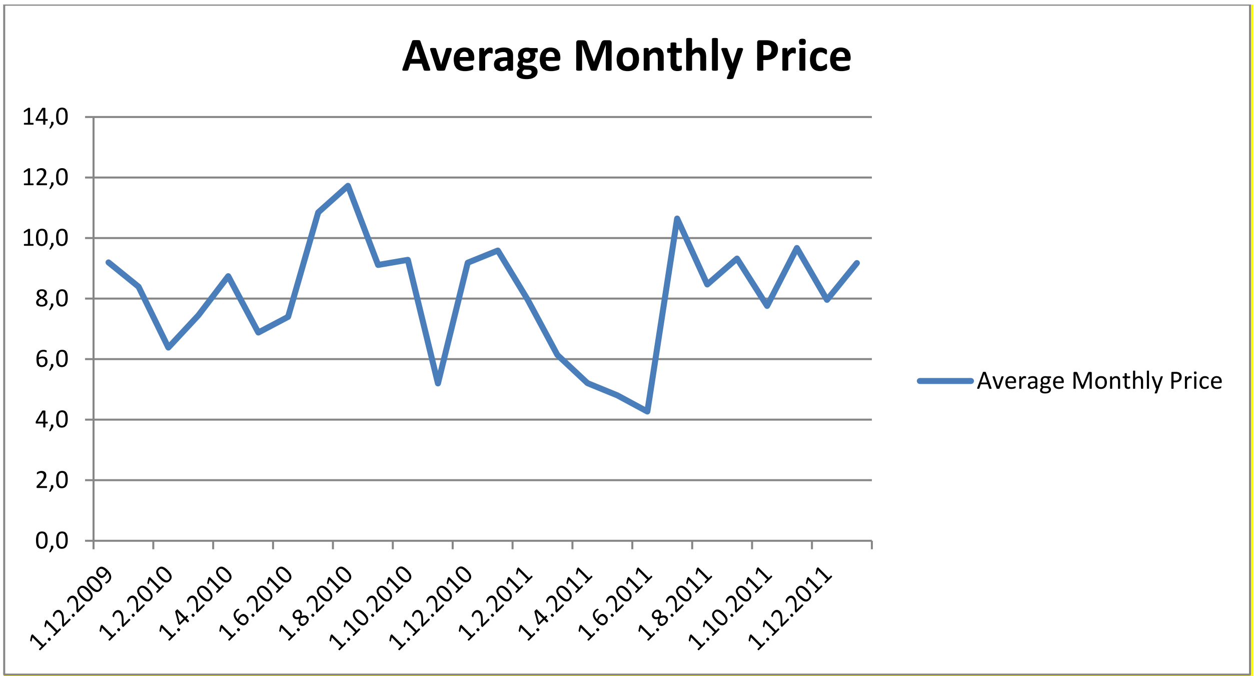


Figure 4. Highest tariffs observed between 01/12/2009-31/01/2012 ($ cents/kWh)[32]

This equity IRR value represents the most optimistic scenario in terms of capital investment and electricity generation whereas electricity tariff is expected to increase due to increasing electricity demand so that the investment becomes attractive.

Expected return on investment for these types of projects should be above 15% as per WB document. For the proposed project, in order to reach this equity IRR values, average electricity tariff must be above 12 $ c/kWh so that the investment will become reasonable. Considering that control wind power plants on generation period is limited, and plant is operational for about five years (i.e. purchase guarantee will end by end of 10th year) the risk for investors will be higher whereas realization of this expectation will increase the premium. Carbon revenue has a significant affect in this respect in terms of decreasing the period for return on investment and minimizing investment risk.

Sub-step 2d - Sensitivity Analysis

Sensitivity analysis has been carried out for three main parameters identified which constitute all income and expenses of project effecting project return;

- Investment Cost

[31] https://rapor.pmum.gov.tr/analytics/saw.dll?PortalPages (please, choose the stated dates to obtain the report)

[32] https://rapor.pmum.gov.tr/analytics/saw.dll?PortalPages

- Operating Cost
- Electricity Sales revenue

For a range of ±10% fluctuations in investment (construction and EM equipment) cost, operating cost and ±20% fluctuation in electricity income, table below has been obtained. Parameters have been selected as per the Guidelines on Investment analysis which are defined as construction and EM equipment costs.[35]

	-10.00	-5	-2.5	0	2.5	5	10
Investment Cost	7,48	6,81	6,49	6,19	5,90	5,61	5,08
Operating Cost	6,31	6,25	6,22	6,19	6,16	6,13	6,07
	-20.00	-10	-5	0	5	10	20
Electricity Income	3,78	5,01	5,60	6,19	6,76	7,33	8,44

Table 5. Sensitivity analysis for proposed project without carbon revenue

Outcome of Step 2:
The investment and sensitivity analysis shows that the VER revenues will improve the financial indicators of the Project remarkably. Considering that figures above are based on a higher price rather than the government guaranteed floor price, optimistic estimations for yearly generation and that those figures do not reflect the risk for investment, role of carbon income is a most significant number to enable the project to proceed.

According to local regulations, electricity price is determined daily according to Market Financial Settlement Center (MFSC) as defined in the regulations and there exists three tariffs during day, peak and night hours. Thermal power plants and HEPPs with storage facilities have flexibility to schedule their generation at peak hours when the tariff is high. However, Wind power plants do not have storage facility therefore may not be able to benefit from high prices realized at when demand is high. According to MFSC figures, electricity tariff fluctuated between 4.3 $c/kWh and 10.2 $c/kWh between 01/12/2009 and 31/01/2012 whereas the weighted average of the tariff has been calculated as 8.1$c/kWh in this period[33]. Since this value shows the spot price at the time of selected investment decision date, it does not provide any guarantee about the actual selling price as the control on generation period and tariff is limited and it may not be possible to generate and sell electricity during peak tariff periods. Also, considering that fluctuation in water resources is high and fact that a part of the electricity can be sold through bilateral agreements to free consumers with a discount rate over market price, guarantee price has been taken as reference in investment analysis which also provides input for evaluation of financing institutions.

Another important parameter affecting equity IRR is investment cost. However, since the agreements have been made and costs are realized as given in financial model, there is no chance to expect a decrease in the investment cost. Operating costs can also affect the equity IRR however, its impact is not significant and does not cause any significant change in equity IRR and the fluctuation percentage to reach the benchmark is very high and not likely.

Based on the above information, it is seen that project is not the most attractive option. Therefore project is considered as additional to the baseline scenario.

Step 3. Barrier analysis

This step is not applied as the additionality is demonstrated in previous steps.

[33] https://pmum.teias.gov.tr/UzlasmaWeb/

Step 4. Common Practice Analysis

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

According to capacity projection report 2012-2021 published by TEIAS, there exist 44 wind power projects operational at time of investment decision having total capacity of 1710.2MW[34]. Among the 44 operational plants, all wind power plants are developed as VER projects.

For the common practice analysis, the geographical boundary is also selected as the Turkish Electricity Grid to be in line with the methodology. The justification for the selection and details of the system is provided under Section B.2.

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

The initial design capacity of the proposed project was 45 MWe. Therefore, the applicable output range is from 22.5 MW to 67.5 MW as per the initial capacity subject to registration.

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

All power plants that have same capacity, within the range 22.5 MW to 67.5 MW[35] has been listed in common practice excel sheet. Properties of the power plants are also indicated in this excel sheet. After excluding the VER projects, no plants left in the list. These power plants are operational before the start date of the proposed project.

$N_{all}=0$

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

It has been determined that, all wind power plants have benefitted from VER. List of the power plant is tabulated below:

PROJECT NAME	INSTALLED CAPACITY	CARBON STANDARD
SARES (GARET ENER.)	22.5	GS
ASMAKİNSAN (BANDIRMA-3 RES)	24	GS
LODOS RES (TAŞOLUK)KEMERBURGAZ	24	GS
TURGUTTEPE RES (SABAŞ ELEK.)	24	GS
KUYUCAK (ALİZE ENER.)	25.6	GS

[34] http://www.teias.gov.tr/KapasiteProjeksiyonu.aspx
[35] http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf

ALİZE ENERJİ (SARIKAYA ŞARKÖY)	28.8	GS
DATÇA RES	29.6	GS
ÇANAKKALE RES (ENERJİ-SA)	29.9	GS
BARES (BANDIRMA)	30	VER+
MAZI 3	30	GS
SEBENOBA (DENİZ ELEK.)SAMANDAĞ	30	VCS
SEYİTALİ RES (DORUK EN.)	30	GS
ÜTOPYA ELEKTRİK	30	GS
ANEMON ENERJİ (İNTEPE)	30.4	GS
AYEN ENERJİ (AKBÜK)	31.5	GS
AKDENİZ ELEK. MERSİN RES	33	GS
SAYALAR RÜZGAR (DOĞAL ENERJİ)	34.2	GS
BELEN HATAY	36	GS
MARE MANASTIR	39.2	GS
KİLLİK RES (PEM EN.)	40	GS
AKRES (AKHİSAR RÜZGAR)	43.8	GS
SUSURLUK (ALANTEK EN.)	45	GS
İNNORES ELEK. YUNTDAĞ	52.5	GS
ZİYARET RES	57.5	GS
BORASKO BANDIRMA	60	GS
ERTÜRK ELEKT. (ÇATALCA)	60	GS

Table 6. Wind Power Plants within the range 22.5 MW to 67.5 MW

Therefore, $N_{diff}=N_{all}=0$

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

$F=1-N_{diff}/N_{all}=1-1\sim0$

$N_{diff}-N_{all}=0$

According to the “Tool for the Demonstration and Assessment of Additionality” (version 07.0.0), if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3, then the proposed project is a “common practice”.
For the proposed project, F=0 and Nall-Ndiff=0, therefore, the proposed project is not common practice within the region. Hence, the proposed project is additional.

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

B.6. Emission reductions

B.6.1. Explanation of methodological choices

Emission factor has been calculated in a conservative as requested by the methodology. Basic assumptions made are;

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

For calculation of the emission factor of Turkish Grid, "Tool to Calculate the Emission Factor for an Electricity System", has been used.

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

ANNUAL DEVELOPMENT OF GENERATION IN TURKEY					
	GENERATION				
YEARS	***THERMAL***	***HYDRO***	***GEOTHERM.WIND***	***TOTAL(GWh)***	**% Low Cost Must Run**
1970	5590.2	3032.8	0	8623.0	35%
1971	7170.9	2610.2	0	9781.1	27%
1972	8037.7	3204.2	0	11241.9	29%
1973	9821.8	2603.4	0	12425.2	21%
1974	10121.2	3355.8	0	13477.0	25%
1975	9719.2	5903.6	0	15622.8	38%
1976	9908.0	8374.8	0	18282.8	46%
1977	11972.3	8592.3	0	20564.6	42%
1978	12391.3	9334.8	0	21726.1	43%
1979	12218.3	10303.6	0	22521.9	46%
1980	11927.2	11348.2	0	23275.4	49%
1981	12056.7	12616.1	0	24672.8	51%
1982	12384.8	14166.7	0	26551.5	53%
1983	16004.1	11342.7	0	27346.8	41%
1984	17165.1	13426.3	22.1	30613.5	44%
1985	22168.0	12044.9	6.0	34218.9	35%
1986	27778.6	11872.6	43.6	39694.8	30%
1987	25677.2	18617.8	57.9	44352.9	42%
1988	19030.8	28949.6	68.4	48048.8	60%
1989	34041.0	17939.6	62.6	52043.2	35%
1990	34314.9	23148.0	80.1	57543.0	40%
1991	37481.7	22683.3	81.3	60246.3	38%
1992	40704.6	26568.0	69.6	67342.2	40%
1993	39779.0	33950.9	77.6	73807.5	46%
1994	47656.7	30585.9	79.1	78321.7	39%
1995	50620.5	35540.9	86.0	86247.4	41%
1996	54302.8	40475.2	83.7	94861.7	43%
1997	63396.9	39816.1	82.8	103295.8	39%
1998	68702.9	42229.0	90.5	111022.4	38%
1999	81661.0	34677.5	101.4	116439.9	30%
2000	93934.2	30878.5	108.9	124921.6	25%
2001	98562.8	24009.9	152.0	122724.7	20%

2002	95563.1	33683.8	152.6	129399.5	26%
2003	105101.0	35329.5	150.0	140580.5	25%
2004	104463.7	46083.7	150.9	150698.3	31%
2005	122242.3	39560.5	153.4	161956.2	25%
2006	131835.1	44244.2	220.5	176299.8	25%
2007	155196.2	35850.8	511.1	191558.1	19%
2008	164139.3	33269.8	1008.9	198418.0	17%
2009	156923.4	35958.4	1931.1	194812.9	19%
2010	155827.6	51795.5	3584.6	211207.7	26%
2011	171638.3	52338.6	5418.2	229395.1	25%

Table 7. Breakdown by source of the electricity generation[36,]

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

- $EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,y} * NCV_{i,y} * EF_{CO_2,i,y}}{EG_y}$
- $\boxed{EF_{grid,\ BM,\ y} = \sum EG_{,m,y} \ . \ EF_{EL,m,y} / \sum EG_{,m,y}}$
- $\boxed{EF_{grid,\ CM,\ y} = w_{OM} * EF_{grid,\ OM,\ y} + w_{BM} * EF_{grid,\ BM,\ y}}$
- $ERy = BEy - PEy - LEy \qquad (4)$
- $BE_y = EG_y \times EF_y$
- PD = $\underline{Cap_{PJ} - Cap_{BL}}$/ $(A_{PJ} - A_{BL})$

Table 8. Equations used for baseline calculations

B.6.2. Data and parameters fixed ex ante

[36] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kgucunkullan%C4%B1m(13-21)/13.xls

Data / Parameter	**$FC_{i,y}$**
Unit	Tons or 1000 m^3 for gases
Description	Amount of fuels consumed by thermal power plants for electricity generation in terms of fossil fuel type i in year y
Source of data	TEIAS web page http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	Data from Grid Operator has been used
Purpose of data	Data used for OM calculation
Additional comment	-

<table>
<tr><td>Data / Parameter</td><td>$EG_{y,}$</td></tr>
<tr><td>Unit</td><td>GWh</td></tr>
<tr><td>Description</td><td>Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must run power plants in year y</td></tr>
<tr><td>Source of data</td><td>For gross generation electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must run power plants in year y :

http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kgucunkullan%C4%B1m(13-21)/13.xls

For net generation and imported electricity
http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/23.xls

http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls</td></tr>
<tr><td>Value(s) applied</td><td><table><tr><td>2009</td><td>150,333</td></tr><tr><td>2010</td><td>149,750</td></tr><tr><td>2011</td><td>162,713</td></tr></table>
462,796 GWh between 2009-2011. (References provided above)</td></tr>
<tr><td>Choice of data
or
Measurement methods and procedures</td><td>Data from Grid Operator has been used</td></tr>
<tr><td>Purpose of data</td><td>Data used for emission reduction calculation (for calculation of OM, Net-to-Gross electricity ratio and share of low-cost must-run sources)</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

Data / Parameter	**$EF_{CO2, i, y}$ i**
Unit	tCO_2/TJ
Description	CO_2 emission factor of fossil fuel type "i" in year "y"
Source of data	-For EF of fossil fuels, IPCC[37] values at the lower limit have been used.
Value(s) applied	**Fuel Source** / **EF(tCO2/Tj)** Coal 89.5 Lignite 90.9 Fuel Oil 75.5 Diesel 72.6 LPG 61.6 Naphtha 69.3 Natural Gas 54.3
Choice of data or Measurement methods and procedures	According to the applied tool, IPCC default values at lower limit of 95% confidence interval can be used. Although, the actual emission reduction is expected to be higher due to high EF of fuels consumed in existing power plants, IPCC values have been used for conservativeness as requested by the methodology.
Purpose of data	EF calculations
Additional comment	-

Data / Parameter	**$\eta_{m,y}$**
Unit	-
Description	Average net energy efficiency of power unit m in year y
Source of data	Default values provided Annex I of the "Tool to calculate the emission factor for an electricity system. -.
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	Data source is selected as per the applied tool.
Purpose of data	Data used for BM calculation
Additional comment	-

[37] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf, Table 2.2

Data / Parameter	**$NCV_{i,y}$**
Unit	Tj/kt
Description	Net caclorific value (energy content) of fossil fuel type i in year y
Source of data	TEIAS web page (http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls)
Value(s) applied	See Annex 4
Choice of data or Measurement methods and procedures	Data has been calculated from Grid Operator's(TEIAS) statistics
Purpose of data	Data used for OM and BM calculation
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

As per the tool, the following six steps for calculation of emission reductions have been applied:

Step 1: Identify the relevant electricity systems

According to the ‘‘Tool to calculate the emission factor for an electricity system’’, Version 03, a project electricity system has to be defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity, and that can be dispatched without significant transmission constraints. Therefore, in this project activity the project electricity system includes the project site and all power plants attached to the Interconnected Turkish National Grid.

For imports from connected electricity systems located in another host country (ies), the emission factor is taken as “0” tCO_2/MWh as requested by the methodology.

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

Option I has been chosen by the project developer hence only grid power plants are included in calculations.

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

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

- **Ex-ante option**
  A 3-year generation-weighted average, based on the most recent data available at the time of submission of the VER-PDD to the DOE for validation, without the requirement to monitor and recalculate the emissions factor during the crediting period, or
- **Ex-post option**
  The year in which the project activity displaces grid electricity, with the requirement that the emissions factor to be updated annually during monitoring.

For this project the ex-ante approach is selected. Data for calculating the three year average is obtained from the period 2009 – 2011, the most recent data available at the time of PDD submission to the DOE.

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

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must run plants / units. The Simple OM has been calculated using option B which is based on Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system. Option B has been selected since;

- Generation and CO_2 data for individual power units are not available
- Only renewable are considered as low cost/must run resources
- Off-Grid power plants are not included in calculations.

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

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

where:

$EF_{grid,\ OM,\ y}$	Simple operating margin CO_2 emission factor in year "y" (tCO_2/GWh)
$FC_{i,\ y}$	Amount of fossil fuel type "i" consumed in the project electricity system in year "y" (mass or volume unit)
$NCV_{i,\ y}$	Net calorific value (energy content) of fossil fuel type "i" in year "y" (GJ / mass or volume unit)
$EF_{CO2,\ i,}$	CO_2 emission factor of fossil fuel type "i" in year "y" (tCO_2/GJ)
EGy	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must run power plants / units, in year "y" (MWh)
i	All fossil fuel types combusted in power sources in the project electricity system in year "y"
y	Either the 3 most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

For the calculation of the Simple OM, the amount of fuel consumption ($FC_{i,\ y}$) and heating values of fuels are taken from website of TEIAS[38,39], the official source of related data. Fuel consumption values for the relevant years are given in table below:

	$FC_{i,y}$ unit [Ton, except for Natural Gas (NG) (1000 m^3)]			
Fuel Type	**2009**	**2010**	**2011**	**Total**
Hard Coal	6,621,177	7,419,703	10,574,434	24,615,314
Lignite	63,620,518	56,689,392	61,507,310	181,817,220
Fuel Oil	1,594,321	891,782	531,608	3,017,711
Diesel Oil	180,857	20,354	15,047	216,258
LPG	111	0	0	111
Naphtha	8,077	13,140	0	21,217
Natural Gas	17,034,548	20,457,793	21,607,635	59,099,976

Table 9. Fuel Consumption in thermal power plants

The NCV of the fuels consumed have been calculated using data from the TEIAS web page. The emission

[38] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls

[39] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/49.xls

factors required for calculation of CO_2 emission coefficient have been obtained through IPCC 2006 guidelines for GHG inventories for fuels. Details of the data used for the calculations are given in Section B.2.

	COEF (tCO_2/kt)	**Total fuel Consumption** (tons or 1000m^3)	**Total Emissions (tCO_2)**
Coal	2,013	24,615,314	49,554,106
Lignite	631	181,817,220	114,711,446
Fuel Oil	3,039	3,017,711	9,169,812
Diesel Oil	3,085	216,258	667,131
LPG	2,863	111	318
Naphtha	2,589	21,217	54,933
Natural Gas	2,021	59,099,976	119,432,554
Total Emissions			**293,590,299**

Table 10. Calculation of emission factors for fuels

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

Year	**Gross Gen. Thermal**[40]	**Internal Consumption**[41]	**Net Gen. Thermal**	**Import**[42]	**Total Supply to the Grid (GWh)**
2009	156,923	*4.2%*	150,333	812	151,145
2010	155,828	*3.9%*	149,750	1,144	150,894
2011	171,638	*5.2%*	162,713	4,556	167,269
	Total Net Thermal Gen.		462,796	6,512	469,308

Table 11Gross/Net electricity generation by Turkish Grid[43]

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

$EF_{grid,\ OM,\ y}$ = **293,590,299** tCO_2 / 469,308,686 MWh
= 0.626 tCO_2/MWh.

[40] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/29(06-2011).xls
[41] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls
[42] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/29(06-2011).xls
[43] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls

In calculating the $EF_{grid, OM ,y}$, data for NCV has been calculated using weighted average values for each fuel.

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

In terms of vintage of data, project participants can choose between one of the following two options to calculate EFgrid,BM,y:
Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

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

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

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

Since data is not available anymore showing the commissioning dates of the plants, those were not tabulated. However, when we look at the plants commissioned in 2011, we see that even we choose the five plants with highest capacity; still total capacity of AEGSET 5 is less than 20% of the AEG total.

List of five plants with largest capacity commissioned in 2011	Type of Fuel	Commissioning Date	Generation Capacity (MWh)
BEKIRLI TES (ICDAS).	COAL	2011	4,320
ALKUMRU	HEPP	2011	828
CENGIZ	Natural Gas	2011	985
AKSA SAMSUN	Natural Gas	2011	980
NUH ENERJI	Natural Gas	2011	900
			8,013

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEGtotal, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEGtotal (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET≥20%) and determine their annual electricity generation (AEGSET-≥20%, in MWh);

The list of the most recent capacity additions to the grid and their average and actual generation capacities are available at the TEİAŞ web page [44,45]. For determination of plants that comprise 20% of the system's generation, gross generation in year 2011 which is 229,365.1 GWh has been taken as reference and its 20%

44 http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kguc(1-12)/8.xls

45 http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf

has been determined as about 42,726 GWh after excluding 15,762.8 GWh generation from plants benefiting from VER revenue. As the most recent data available is 2011, plants commissioned in 2011 was fully included in the calculations. Thus, total capacity included in BM calculation has increased to 54,546 GWh.

(c) From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation (SETsample); Identify the date when the power units in SETsample started to supply electricity to the grid. If none of the power units in SETsample started to supply electricity to the grid more than 10 years ago, then use SETsample to calculate the build margin. In this case ignore steps (d), (e) and (f).

SET≥20% is selected as (SETsample) because the set of power units that comprises the larger annual electricity generation. There is no power units in SETsample started to supply electricity to the grid more than 10 years ago. Therefore the steps (d), (e) and (f) are ignored.

The Build Margin emission factor $\mathbf{EF}_{\text{grid, BMs, y}}$ is calculated as the generation-weighted average emission factor of a sample of power plants "m" for a specific year, as follows:

$$\boxed{EF_{grid,\,BM,\,y} = \sum EG_{,m,y} \,.\, EF_{EL,m,y} \,/\, \sum EG_{,m,y}} \qquad \textbf{(2)}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year "y" (tCO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit "m" in year "y" (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit "m" in year "y" (tCO_2/MWh)
m	=	Power units included in the build margin
y	=	Most recent historical year for which power generation data is available

"Tool to Calculate the Emission Factor for an Electricity System" has been used for plant efficiency data although this approach is very conservative. Since tool does not contain any specific data for plants with LPG, Naphtha etc. all of the plants consuming liquid fuels have been considered as open cycle plants. Plants using lignite and coal have been assumed as using subcritical technology, whereas natural gas plants have been assumed as combined cycle plants. The assumptions have been based on TEIAS statistics which gives heating values of fuels consumed in thermal power plants[46] and corresponding electricity generation which shows that values used are very conservative compared to actual situation.

	EF CO_2 (tCO2/Tj)	Generation Efficiency[47]	EF (tCO_2/MWh)
Coal	89.50	39.0%	0.826
Lignite	90.90	39.0%	0.839
Fuel Oil	75.50	39.5%	0.688
Diesel	72.60	39.5%	0.662
LPG	61.60	39.5%	0.561
Naphtha	69.30	39.5%	0.632
Natural Gas	54.30	60.0%	0.326

Table 12 Calculation of emission factor from most recent power plants

The build margin emission factor has been determined for the most recent capacity additions as shown in

[46] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/49.xls

[47] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v3.0.0.pdf

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

	Generation- MWh	EF - tCO2/MWh	Emissions(tCO2)
Coal	15,323.3	0.826	12,659
Lignite	184.0	0.839	154
Fuel Oil	1,485.0	0.688	1,022
Diesel	0.0	0.662	-
LPG	0.0	0.561	-
Naphta	0.0	0.632	-
Natural Gas	37,553.8	0.326	12,235
		Total	**26,071**

Table 13 Most recent capacity additions by fuel source

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

$$\mathbf{EF_{grid,\,BM,\,y}} = 26{,}071\ tCO_2 / 54{,}546\ MWh$$
$$= \mathbf{0.478\ tCO_2/MWh}$$

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

As per the , weighted average baseline emission factor is calculated as follows;

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

Where:

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

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

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

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

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

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

$$\mathbf{EF_{grid,\,CM,\,y}} = 0.75 * 0.626 + 0.25 * 0.478 = \mathbf{0.589}$$

The combined margin emission factor is therefore **0.589 tCO_2/MWh.** Emission factor will remain same during the first crediting period as recommended by the methodology.

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

$$ERy = BEy - PEy - LEy \qquad \mathbf{(4)}$$

Where:

ERy = Emission reductions in year *y* (tCO_2)
BEy = Baseline emissions in year *y* (tCO_2)
PEy = Project Emissions in year *y* (tCO_2)
LEy = Leakage emissions in year *y* (tCO_2)

Baseline emissions
Baseline emission is calculated according to the formula

$$BE_y = EG_y \text{ x } EF_y$$

Where:

EGy = Net electricity delivered to the grid by the project activity in year y excluding transmission losses of the grid.
EFy = Emission factor calculated according to selected methodology

Baseline emissions
Baseline emission is calculated according to the formula

$$BE_y = EG_y \text{ x } EF_y$$

Where:

EGy = Net electricity delivered to the grid by the project activity in year y excluding transmission losses of the grid.
EFy = Emission factor calculated according to selected methodology

Project emissions

The proposed project activity involves the generation of electricity by a wind power plant which has does not cause any significant emissions. Therefore project emissions are considered as “0”.

$$PEy = 0$$

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

$$LE_y = 0$$

As a result: Total Emission Reduction is;

$$ERy = BE\ y$$

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2014 (01/10/2014-31/12/2014)	24,018	0	0	24,018
2015	96,072	0	0	96,072
2016	96,072	0	0	96,072
2017	96,072	0	0	96,072
2018	96,072	0	0	96,072
2019	96,072	0	0	96,072
2020	96,072	0	0	96,072
2021 (01/01/2021-30/09/2021)	72,054	0	0	72,054
Total	672,504	0	0	672,504
Total number of crediting years	7			
Annual average over the crediting period	96,072	0	0	96,072

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{PJ,grid,i,y}$
Unit	MWh/yr
Description	Quantity of electricity generated and supplied by the project power plant to the grid in year *y excluding latest two turbines.*
Source of data	Calculated based on measurements from more than one electricity meters. Generation of two new turbines will be obtained from SCADE system and excluded in ER calculations.
Measurement methods and procedures	Electricity meters installed at the grid interface for electricity export to grid will be used for total generation. SCADA system readings will be used for monitoring generation from two new (3.6 MWm) turbines. The quantity of electricity supplied by the project plant/unit to the grid; and the quantity of electricity delivered to the project plant/unit from the grid will be monitored. Net electricity fed to the grid (Excluding two new turbines) will be used in calculations. Generation data will be recorded by two metering devices continuously. These records will provide the data for the monthly invoicing to TEIAS. Generation will be recorded via remote reading system. The quantity of electricity supplied by the project plant/unit to the grid (ISVM) and The quantity of electricity delivered to the project plant/unit from the grid (EUCM) will be measured. Two calibrated

	meters will back-up each other. ISVM (Electricity fed to the grid) and UECM (Electricity consumed from the grid) data given in EPIAS records will be used for emission reduction calculations which is accessible using a password provided to electricity generation companies. Crosscheck of EPIAS records will be done by using the records of project site. <table><tr><td>Meter</td><td>Main meter</td><td>Back-up meter</td></tr><tr><td>Serial number</td><td>004710642012</td><td>004710662012</td></tr><tr><td>Type/ accuracy</td><td>Elster A 1500/ 0,5S</td><td>Elster A 1500/ 0,5S</td></tr><tr><td>Calibration date</td><td>26/03/2014</td><td>26/03/2014</td></tr></table>
Monitoring frequency	Continuous measurement and at least monthly recording

QA/QC procedures	In cases where electricity meters are regulated (e.g. the electricity is supplied to the electric grid), the electricity meter will be subject to regular maintenance and testing in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements. The calibration of meters, including the frequency of calibration, should be done in accordance with national standards or requirements set by the meter supplier or requirements set by the grid operators. The accuracy class of the meters should be in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements. Calibration of the meters were done in 30/05/2015 as it is stated in first index protocol which is provided to DOE. Hence, this calibration will be valid till 2025 (for ten years) according to regulations related with metering devices. Accuracy class of the meters are also proper (0.5S) within the conditions which are stated in the same law. Accuracy class of the meters can be checked from product specification documents provided to DOE.
Any comment	-

B.7.2. Sampling plan

No sampling plan will be necessary

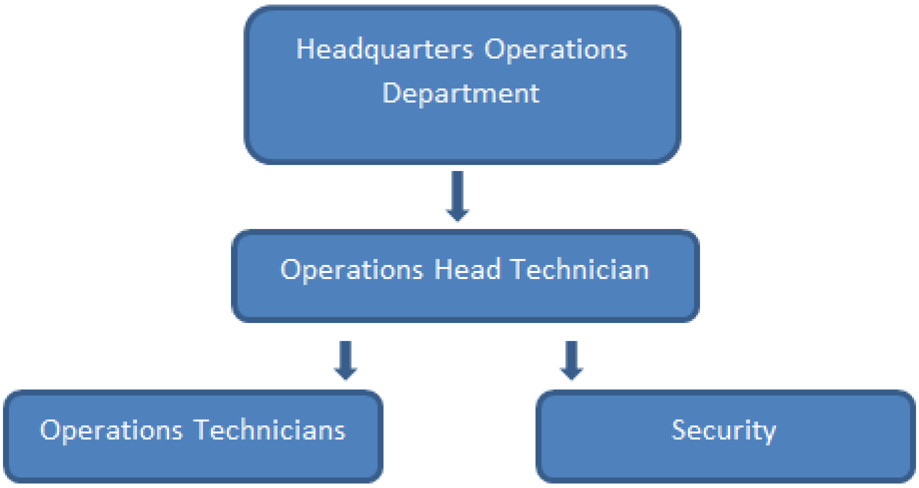
B.7.3. Other elements of monitoring plan

Project capacity extension studuies have been initiated in 2017 via türbine agreement however, construction could be started in end of 2018. Since application to GScould not be made within one year of project start date, extension part of the project was not eligible for GS certification. Therefore, generation from latest two turbines have been exlcuded from GS certification and claims for GS-VER certificates will be made only for initial turbines.

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

Generation data collected during crediting period will be submitted to GTE Carbon who will be responsible for calculating the emission reduction subject to verification. Generation data will be used to prepare monitoring reports which will be used to determine the vintage from the project activity. These reports will be submitted to the duly authorized and appointed Designated Operational Entity 'DOE' before each verification period.

The monitoring system organization chart is shown in Figure below, in which the authority and responsibility of project management are defined.



VER Team Members is expected to include the following staff:

Plant Manager (Operations Head Technician): Operations head technician has been assigned as the overall responsible of compliance with VER monitoring plan. He is responsible for day to day running of plant, recording and monitoring of relevant data. Operation technicians will be assisting him with the gathering and reporting of the data.
Accounting Management (Headquarters Operations Department): Since the company is a part of larger group, financial matters are managed from the headquarters. Operations Department is responsible for accounting, handling data about power sales, social security documents, invoicing and other personnel affairs.

GTE Carbon: Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

EPİAS records will be used as the primary source of data for electricity generation since the billing is based on the EPİAS records. Generation of the plant can monitored from EPIAS web platform which is accessible using a password provided to electricity generation companies. ISVM (Electricity fed to the grid) and UECM (Electricity consumed from the grid) data given in EPIAS records will be used for emission reduction calculations. Electricity generation of the Canta WPP will be cross checked by using the records of metering devices at project site. Two metering devices (one of them used as spare) will be used for monitoring the electricity generated by the power plant

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

The calibration and maintenance of the meters will be carried out in line with the by law on Metering and Metering Devices[48]. Accordingly, the meters are calibrated and sealed by TEIAS before the commissioning of the power plant. The meters will be calibrated by TEIAS when there is an inconsistency between two devices.

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

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

Date of completion of the study on application of the selected methodology:

01/08/2019 Responsible entities: Please refer to Appendix 1.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

Start date of project activity is determined as 26/03/2012, date of turbine agreement.

C.1.2. Expected operational lifetime of project activity

>> The operational lifetime of the project is about 49 years as per the license issued. According to the technical lifetime of turbines which is given as 25 years as per the tool[51] and also estimated as 20 years by experts, turbines will be renovated or replaced and project will continue to be operated by the project owner until end of the license period. Project will be delivered to government authority at no cost at the end of license period.

C.2. Crediting period of project activity

C.2.1. Type of crediting period

Project will use two times renewable crediting period, and this is the first crediting period.

C.2.2. Start date of crediting period

Start date of crediting period is chosen as 01/10/2014.

C.2.3. Length of crediting period

First crediting period will be valid for 7 years and 0 month. 01/10/2014 – 30/09/2021

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

Environmental impacts of the project have been assessed as per the regulations and a preliminary EIA has been prepared for the project. The file has been assessed by relevant authorities and assessed as sufficient as the impacts of the project is not seen as significant. Project owner has also carried out an ESIA report on top of the pre-EIA report at international standards for better assessment and evaluation of the project and measures required. Also, ornithology report has been prepared for the project for the by academicians.

Within the scope of the ESIA study, all potential impacts of the project including air quality, noise, waste disposal, landscape, visual impacts, H&S issues have been assessed and measures identified has been given in the document prepared.Also, more detailed ornitology reports have been has been prepared study for the project after commissioning.

D.2. Environmental impact assessment

As per the project type and location, no significant impact has been identified during assessment and stakeholder consultations.

Within the scope of the studies and analysis given above, environmental impacts have been identified together with measures planned to be implemented.

51 http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

Local Stakeholder Meeting for 45 MW Çanta Wind Power Plant (WPP) project was held at Çanta Village Coffee House on 16/04/2012 in Silivri District at Istanbul Province in Turkey. The meeting was organized in line with the Gold Standard requirements. The stakeholders and the list of invitation are identified accordingly. The meeting covered all agenda items recommended by the Gold Standard.

Agenda

14:30-14:45 Opening and Introduction of the Çanta Wind Power Plant Project
14:45 -15:00 Climate Change and Carbon Markets, Global Tan Energy
15:00 -15:20 Explanation of Grievance Mechanisms and Blind SD Exercise and discussion on monitoring
15:20-15:50 Q &A
15:50- 16:00 Evaluation and feedback session
Closure

Five females attended to the meeting.

E.2. Summary of comments received

Meeting was organized at the village coffee house on 16/04/2012 with more than 100 locals attendance. There were five females at the meeting.

To start with, Kemal Demirkol Managing Director form GTE gave a brief opening speech explaining the aim of the meeting and introduced project representatives Sezgin Baktır and Serhat Çakır from Boydak Enerji Üretim A.Ş. and Yusuf Pehlivan from Almer Environmental Consultancy. Sezgin Baktır briefed the locals about the about project and company. After that GTE gave information about climate change and its effects, carbon certification and the Gold Standard process. Also Kemal Demirkol explained the grievance rule of the Gold Standard stressing that the meeting was just the beginning of a process for at least 7 years. It was highlighted that the GS was also considerate about the social and environmental impacts of the projects and required continuous feedback from the stakeholders, especially of locals. Then, it was explained that a grievance notebook would be placed at a secure and easily accessible place, such as the muhktar's, where they could fill in whenever there was a complaint or request which would be regularly checked by the project manager. As a result of consultation with the locals, it was decided that the notebook would be debited on the muhktar. During this part of the meeting, the contact details of the project owner, project proponent and the GS Regional Manager's were shared with the muhktar and the participants. As following, Yusuf Pehlivan gave brief explanation on about project's environmental and social impact. After that the questions from villagers were answered. Questions and answers are below.

Local from Değirmen Village: What are the effects of the project on human health and occupational areas?
Yusuf Pehlivan: We have tried to explain the impacts directly related to human health and envirionment. So far, no negative impact of turbines on human health has been detected. This is the 1/25000 map of the area and the locations of the turbines. We can try to give further detail if you have any question.

Local Participant: What is the minimum distance to the settlement so that the people will not be affected from the turbines? What is the minimum distance to the turbines that the people can build house?
Yusuf Pehlivan: the most important impact of the project is the noise problem. There is a safety distance around the turbines.

Mehmet Has(Silivri Municipality): Will you expropriate the land or apply easement for lands used?

Sezgin Baktır: There are many different type of ownerships in the project area including private land, grassland and forest area. Ownership of the switchyard area is belongs to our companys. Therefore, we'll only use land turbine basements and try to use existing or cadastral road as much as possible.

Mayor of Silivri: There are many project near Silivri including 3rd Airport, railway and Canal Istanbul. There is also significant agricultural activity in this region and fertility of the land is high. We should protect agricultural land and also meet energy demand. From our perspective, there are three main issues which are ownership of the lands, impact on agricultural production and grassland. There may be other concerns of locals, we'll make our decision after having locals' opinion about the project. We should first listen what locals are thinking?

Şenol Köroğlu:How/Why did you choose Çanta/Değirmenköy?

Head of Chamber of Agriculture: Will this project impact the studies on development plan for this region? There will be a safety distance also. Are we going to be able to build barns near the turbines?

Sema Kurt(Silivri Municipality): There are four tumulus in this region and there should be at least 100m safety distance. Have you considered this in your layout?

Local Participant: There is a grassland here. EPDK has made an attempt to change the status of the grassland. EPDK should also be here.

Sezgin Baktır: The location of the projects are determined according to several factors including grid capacity, wind efficiency, status of the land and existing structures. We have considered the tumulus in layout and cancelled location of several turbines considering safety distances. For development plan issue, you'll be able to build your barns. As per the regulations, you can only use and expropriate the area you really need for the project. Our boundaries and coordinates are given in the generation license. We have to stay within these boundaries. We have informed and invited EPDK to this meeting. But they said they'd come to the site later when the expropriation process is initiated. Before issuance of license, 18 institution has been consulted and their opinions have been collected.

Local Participant: After you implement the project, will it prevent zoning of this region for construction? Agricultural income is not very high and expectation of many farmers is allowing construction in this area.

Local Participant: There is a forest area in the backyard of Degirmenkoy. There is no agricultural land or grassland. Why don't you built it there? Will you use all the land between the turbines? How will you mange the expropriation process? If our land is partially remains within the project site, will you expropriate all of it?

Sezgin Baktır: This is up to government agencies. We'll only be using the land allocated for the project and try to minimize area used. Location and boundaries are determined by the license. We'll not be using all the land within the boundary, just the turbine locations will be used . Rest of the land will still be accessible by others. If after expropriation, a small amount which is not feasible to cultivate remains, you may request and we may expropriate the remaining land also.

After that section, the sustainability blind test was held which was challenging as the locals explicitly declared that the issues were difficult to discuss for them.

E.3. Report on consideration of comments received

Stakeholder comment	Was comment taken into account (Yes/ No)?	Explanation (Why? How?)

Question on contribution to the village	Yes	During the construction phase constant feedback will be collected from the village to address their needs.
Question on the progress of the project	Yes	The project is expected to start by end of 2014/early 2015
Question on origins of the equipment	Yes	Even though the company provides its best effort to use domestic equipment, there isn't any rotor production in Turkey
Question on Noise	Yes	Project will use new turbines which have less noise compared to previous generation turbines. Also, measurements will be carried out at nearest settlements to determine risks and implement measure if necessary.
Question on Local Recruitment	Yes	Locals will have priority in recruitment if they have relevant skills.

Stakeholder Feedback Round

During the local stakeholder meeting, the participants have been informed about the feedback round and its importance on following up the project activities, as well as addressing their potential issues. Since, no significant concern has appeared during LSC meeting SFR was not conducted as a live meeting.
In order to prepare for the feedback round, a summary of the consultation report prepared in Turkish was sent to the identified stakeholders and participants through mail or local authorities. International offices of Helios International, Mercy Corps and local representative of GS were included in the feedback round also.

Soft copies of the project documents were available on the web site of GTE (www.gtecarbon.com). Hard copies of the LSC Report and/or Passport will be available during the 2-month long feedback round for those who do not have internet access.

SFR for Canta WPP was initiated on 11/10/2013 and is finalized on 13/01/2014. Feedbacks collected are supportive of the project. For the documents related to the organization of the SFR and the feedbacks, please, see the Gold Standard Passport.

During the stakeholder consultation meeting, no significant issues have been raised by the participants that would make a revisit required for the sustainable development.

SECTION F. Approval and authorization

Project is developed as a GS-VER project. Since Turkey does not have a cap and trade system or issue approval letter, no authorization or approval is needed.
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Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Person/entity responsible for completing the CDM-MR-FORM
Organization name	BOYDAK ELEKTRİK URETiM SANAYi VE TiCARET AS
Street/P.O. Box	Ziya Gökalp Mahallesi
Building	No:3
City	İstanbul
State/region	-
Postcode	34306
Country	Turkey
Telephone	+90 216 267 42 06
Fax	+90 216 267 42 09
E-mail	Serhat.sert@boydak.com
Website	www.boydak.com
Contact person	
Title	Mr
Salutation	Sert
Last name	-
Middle name	Serhat
First name	Business Development
Department	Management
Mobile	-
Direct fax	+90 216 267 42 06
Direct tel.	+90 216 267 42 09
Personal e-mail	Serhat.sert@boydak.com

Project participant and/or responsible person/ entity	☐ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	GTE CARBON
Street/P.O. Box	Ehlibeyt Mah 1259. Sokak
Building	7/2
City	Ankara
State/Region	-
Postcode	06520
Country	Turkey
Telephone	+90 312 472 35 00
Fax	+90 312 472 33 66
E-mail	gte@gtecarbon.com
Website	www.gtecarbon.com
Contact person	Mehmet Kemal Demirkol

Title	Director
Salutation	Mr.
Last name	Demirkol
Middle name	Kemal
First name	Mehmet
Department	Management
Mobile	-
Direct fax	+90 312 472 35 00
Direct tel.	+90 312 472 33 66
Personal e-mail	kemal@gtecarbon.com

Appendix 2. Affirmation regarding public funding

No public funding is used for the project activity

Appendix 3. Applicability of methodology and standardized baseline

Applicability of project activity is given in Section B.2

Appendix 4. Further background information on ex ante calculation of emission reductions

Data used in calculation of OM for Turkish Electricity Grid

Table 9 Values used in calculation of OM

Fuel Type	NCV (Gj/t) (1000m^3 for gas)	EF (tCO_2/Gj)	COEF (tCO2/t)
Coal	24.0	0.0895	2.15
Lignite	7.1	0.0909	0.65
Fuel Oil	41.8	0.0755	3.16
Diesel Oil	44.2	0.0726	3.21
LPG	0.0	0.0616	0.00
Naphtha	0.0	0.0693	0.00
Natural Gas	37.2	0.0543	2.02

Table 10 Amount of fuels used for electricity generation

Fuel Type	2012	2013	2014	Total Fuel Consumption 2012-2014	Total Emission 2012-2014
	Ton or 1000 m3 (for gas)				
Hard Coal	12,258,462	12,105,930	14,501,934	38,866,326	83.535.700
Lignite	55,742,463	47,120,306	57,696,139	160.558.908	103.966.359
Fuel Oil	564,796	573,534	754,283	1.892.613	5.976.176
Diesel Oil	176,379	129,359	119,988	425.726	1.365.288
LPG	0	0	0	0	0
Naphtha	0	0	0	0	0
Natural Gas	23,090,121	22,909,746	25,426,014	71.425.881	144.285.518

Data used in calculation of BM for Turkish Electricity Grid

Table 11 Net calorific values, generation efficiency and emission factor data used in calculations

	A NCV	B EF $_{CO2}$	D	E (=3.6/D/1000*B)
	(Gj/t or m^3 for gas)	(tCO_2/Gj)	Generation Efficiency	EF tCO_2/GWh
Coal	24.0	0.0895	39.0%	0.826
Lignite	7.1	0.0909	39.0%	0.839
Fuel Oil	41.8	0.0755	39.5%	0.688
Diesel	44.2	0.0726	39.5%	0.662
LPG	0.0	0.0616	39.5%	0.561
Naphtha	0.0	0.0693	39.5%	0.632
Natural Gas	37.2	0.0543	60.0%	0.326

Table 12 Most recent capacity additions corresponding to 20%

Fuel Type		Electricity Generated (EGm,y)		Emission Factor of Power Unit ($EF_{EL,m,y}$)	Share in Total Generation
	2013 (MWh)	2014 (MWh)	TOTAL	tCO_2/MWh	%
Coal	0.0	19,702	19,702	0.826	43.8%
Lignite	0.0	394.0	394.0	0.839	0.9%
Fuel Oil	0.0	0.0	0.0	0.688	0.0%
Diesel Oil	0.0	0.0	0.0	0.662	0.0%
LPG	0.0	0.0	0.0	0.561	0.0%
Naphtha	0.0	0.0	0.0	0.632	0.0%
Natural Gas	10,226.8	8,755.1	18,982.0	0.326	42.2%
Renewable (Biomass, wastes, Hydro, wind, geothermal)	1,341.0	4,578.0	5,919.1	0.826	13.2%
Total	**11,567.9**	**33,429.6**	**44,997.0**		**100.0%**

Appendix 5. Further background information on monitoring plan

N/A

Appendix 6. Summary of post registration changes

N/A

Appendix 7. Generation Licence

T.C. ENERJİ PİYASASI
DÜZENLEME KURUMU

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi Yenilenebilir Enerji Kaynağı kullanmaktadır.

Lisans No : EÜ/3382-11/2051

Tarih : 18/08/2011

Bu Lisans; **Boydak Enerji Üretim ve Ticaret Anonim Şirketi'ne**, İstanbul ili, Silivri ilçesinde rüzgar enerjisine dayalı **Çanta RES** projesi kapsamında 18/08/2011 tarihinden itibaren 49 yıl süreyle üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 18/08/2011 tarihli ve 3382-11 sayılı Kararı ile verilmiştir.

Bu lisans, genel ve özel hükümleri ile ayrılmaz bir bütündür.

Hasan KÖKTAŞ
Başkan

Appendix 8. EIA-Exemption Letter

T.C.
İSTANBUL VALİLİĞİ
Çevre ve Şehircilik İl Müdürlüğü

SIFIR ATIK

Sayı : 71280893-220.03-E.68956 27.06.2019
Konu : ÇED / Belge Geçerliliği.(Boydak Enerji Üretim ve Tic. A. Ş.)

enerji santralleri" kapsamında olmakla birlikte, 13.02.2009 tarih 2009/04-06-826 Karar No'lu Çevresel Etki Değerlendirme Belgesi ile ilgi (c) belge geçerliliği görüş yazısının mevcut olması nedenleriyle, anılan Yönetmelik hükümlerinin uygulanmasına gerek görülmemiştir. Dolayısıyla BOYDAK ENERJİ ÜRETİM VE TİC. A. Ş. tarafından işletilen ve planlanan "Rüzgar Enerji Santrali Projesi - 21 adet rüzgar türbini (50 MWe/54,7 MWm)" faaliyetine ait İstanbul Çevre ve Şehircilik İl Müdürlüğü tarafından ilgi (b) yazımız ile verilen 13.02.2009 tarih 2009/04-06-826 karar nolu ÇED Belgesinin geçerliliği devam etmektedir.

Ancak, bahse konu faaliyet ile ilgili olarak çevre değerlerinin korunması açısından 2872 sayılı Çevre Kanunu (Değişik 26/4/2006-5491) ve bu Kanuna istinaden çıkarılan Yönetmeliklerin ilgili hükümlerine uyulması ve diğer mer'i mevzuat çerçevesinde öngörülen gerekli izinlerin alınması yasal bir zorunluluk olup, faaliyet ile ilgili herhangi bir proses değişikliği, kapasite artırımı, alan genişlemesi ve ÇED Yönetmeliğinin 18.maddesi gereğince "Çevresel Etki Değerlendirmesi gerekli Değildir" kararını aldıktan sonra projede yapılacak Yönetmeliğe tabi değişikliklerin olması halinde Valiliğimiz Çevre ve Şehircilik İl Müdürlüğüne başvuruda bulunulması gerekmektedir.

Bilgilerinizi ve gereğini rica ederim.

e-imzalıdır
Ergül ÇINAR
Çevre ve Şehircilik İl Müdür Yrd. V.

Bu Belge Elektronik
İmza İle İmzalanmıştır
28../06/2019

Not: 5070 sayılı Elektronik İmza Kanunu gereği bu belge elektronik imza ile imzalanmıştır.

Evrak Doğrulama Kodu : QOSHFFFGSMLMBNRMFLXK Evrak Takip Adresi: https://www.turkiye.gov.tr/cevre-ve-sehircilik-bakanligi

ÇED Şube Müdürlüğü Barbaros Bulvarı No: 137 Gayrettepe Beşiktaş/İSTANBUL
Tel: 0212 318 4100 Faks: 0212 318 4144 e-posta: istanbul@csb.gov.tr
Web: https://istanbul.csb.gov.tr/ KEP: istanbulcevreveschircilik@hs01.kep.tr

Bilgi için:Yeşim ARKAN
Mühendis

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