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	Icdas Biga Wind Farm Project
Version number of the PDD	Verison 5.0
Completion date of the PDD	28.07.2016
Project participant(s)	İçdaş Çelik Enerji Tersane ve Ulaşım San. A.Ş(Project Owner) Carbon Clear(Project Consultant)
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 - version 16
Estimated amount of annual average GHG emission reductions	90,097 tCO_2e/yr

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project main aims are to generate electricity from wind, reduce the need of fossil fuel and import needs and increase the diversity in energy generation. The project corresponds to the İçdaş Biga Wind Power Plant of İçdaş Çelik Enerji Tersane ve Ulaşım San. A.Ş. The firm capacity of the plant will be 60MW and will consist of 19 turbines with 3.2 MW capacity. It is expected to generate 168 GWh annually and feed the national grid. The greenhouse gas emission-free electricity generated by the project will enable the grid mix to lower its carbon intensity. The project is expected to reduce approximately 90,097 tonnes of CO_2e per year and 630,680 tonnes of CO_2e for the first crediting period.

The main sources for energy generation in Turkey are fossil fuels. The greenhouse gas emissions (GHG) resulting from the generation of electricity from fossil fuels accumulate into the atmosphere, indirectly provoking climate change. This project will contribute to mitigate the emission of greenhouse gases.

The area where the turbines and switchyard are going to be installed was forest land. The building and equipments will cover only 5% of the total project area and it will be possible to continue forestation activities within the area. The nearest residential areas are Değirmencik, Örtülüce, Çakırlı, Kemer and Aksaz villages and Karabiga town.

The project will help Turkey in many aspects of sustainable development path. By increasing the renewable energy share in Turkey's energy mix, both the pollutant (e.g NO_x, $SO_{2)}$ and GHG emissions from fossil fuel combustion will be reduced. The project will be compatible with local environmental as well as regional and national regulations. It has also been approved by the Çanakkale Provincial Directorate of Environment and Forestry that the project does not require EIA.
The project will also have economical positive impacts. The construction of the project will be done by hiring people from surrounding localities and hence contributing to the local economy.

Moreover, as a part of the project activities, some physical support for local schools will be provided, for example, construction of new classes, granting computers and projectors. Scholarships for high school and university students will be provided and young people will be educated at the yachting and swimming clubs of the company. Al these activities will help to increase the Human and institutional capacity of the local people.

A.2. Location of project activity

A.2.1. Host Party

The host party is Turkey.

A.2.2. Region/State/Province etc.

Çankakkale province.

A.2.3. City/Town/Community etc.

On the hills around Canakkale, in the Biga district.

A.2.4. Physical/Geographical location

The project will be located on the hills around Canakkale in Turkey. This project shall be implemented at location of Keçibayırı Tepe-Muhittin Tepe, Zeytin Tepe-Boz Tepe, Hacıdede Tepe-Güllüdere Tepe, Küçükalan Tepe- Üçyollar around Biga District, which is the largest district of Çanakkale Province, around 90km from the city centre.

The district is surrounded by Gönen in the east, by Lapseki in the west, by Çan in the South and by Sea of Marmara in the north. Total population of the district is 80,849 and total population of the central district is 36,542. The coordinates of the turbines installed at the project activity are listed in table 1 and the figure 1.

Table 1 Coordinates of the location of the planned wind turbines

	East	North		East	North
T1	512085	4474369	**T11**	515729	4471836
T2	512372	4474171	**T12**	516038	4471648
T3	513246	4474221	**T13**	515958	4471222
T4	513341	4473807	**T14**	516529	4471091
T5	513650	4473663	**T15**	519248	4477433
T6	513460	4472973	**T16**	519483	4477183
T7	513717	4472675	**T17**	520077	4477458
T8	513631	4471981	**T18**	521462	4478454
T9	514500	4472930	**T19**	521819	4478189
T10	514607	4472437			

Source: Çanakkale Governorship, Directorate of Cadastre

Figure 1 Project Location

A.3. Technologies and/or measures

Wind power is a well-established technology that, once built and in operation, has no carbon emissions and has no fuel costs. It has the advantage of quick installation but the disadvantage of supply-demand mismatch, due to the variability of wind. Nevertheless, there is great potential for wind power in Turkey. According to the Turkish Wind Potential Atlas developed in 2007, the country has minimum wind energy potential of 5,000 MW in regions with annual wind speeds of 8.5 m/s and higher and 48,000 MW in areas with speeds higher than 7.0 m/s. (Tunç & Pak, 2012)[1]

The Icdas Biga Wind Power Plant has a capacity of 60MW with 19 wind turbines expected to generate 168.192 MWh/year. There will be 19 wind turbines with rated power of 3.2MW and rotor diameter of 103m. It is firstly designed to be carried out with a production capacity of 106 MW. However since the installed power is limited to a production capacity of 60 MW, which is the transformer power in that location, it is revised as 60 MW.

The wind turbines are purchased from the General Electric Company. The wind turbine employs a doubly-fed induction generator with a power converter interfacing the rotor to the grid. The wind turbine is capable of supplying/drawing reactive power to/from the grid thus contributing to grid voltage support.

3.2 is a three-bladed horizontal axis upwind wind turbine with rated power of 2000kW and rotor diameter of 103m. The SL3000/113 Normal Temperature Type is applicable to areas in normal environmental temperature with survival ambient temperature of -20°C ～+50°C and operational ambient temperature of -15°C～+30°C. It consists of rotor, blades, blade pitch control system, hub,

[1] M. Tunç & R. Pak, Impacts of the Clean Development Mechanisms on wind energy investments in Turkey, 2012

gearbox, bearings, brake system, generator, gearbox/generator coupling, yaw system, tower, nacelle, wind sensor and lightning rod, lightning protection, control system, power converter and medium voltage transformer and switch gear**.** The rotor is connected to the gearbox flange via a hub spacer which is fitted in the inner ring of main bearing. The outer ring of the main bearing is bolted to the main frame. The rotor load transmits to the main frame via main bearing. The main frame is connected to the tower top flange via yaw bearing. Inside the nacelle there employs a maintenance crane to perform maintenance, overhaul, and exchange for gearbox, generator, and rotor blades.

Table 2 Turbine Specifications

Design Data	
Rated Power	3.2 MW
Rotor Blade Diameter	103 m
Tower Hub Height	85m
Life Time	20 years*
Rotor Blade	
Number of rotor blades	8,332 m^2
Swept Area	7389.8 m^2
Rated Speed	14 rpm
Rotating Speed Range	9.2-14.8 rpm
Rotation	Clockwise
Number of Rotor Blades	3
Lightning Detector	
Signal	Ultrasonic
Generator	
Type	Double-fed induction generator
Gear Box	
Stages	multi-stage planetary/helical design

Reference: Technical Documentation Wind Turbine Generator Systems 2.x Series, GE Power and Water
*The life time of the equipment is gathered from the Design Evaluation Conformity Statement by Tüv Nord.

İçdaş wind farm will be connected to the grid via Turkish Electricity Transmission Company's (TEİAŞ) Biga and Çan transformer stations. The connection point and the location of the electricity metering equipments are demonstrated in the single line diagram. (Figure 2) The plant load factor is 32%. This figure is derived from operating practices. It is calculated via dividing the total amount of energy the plant produced during a period of time by the amount of energy the plant would have produced at full capacity.

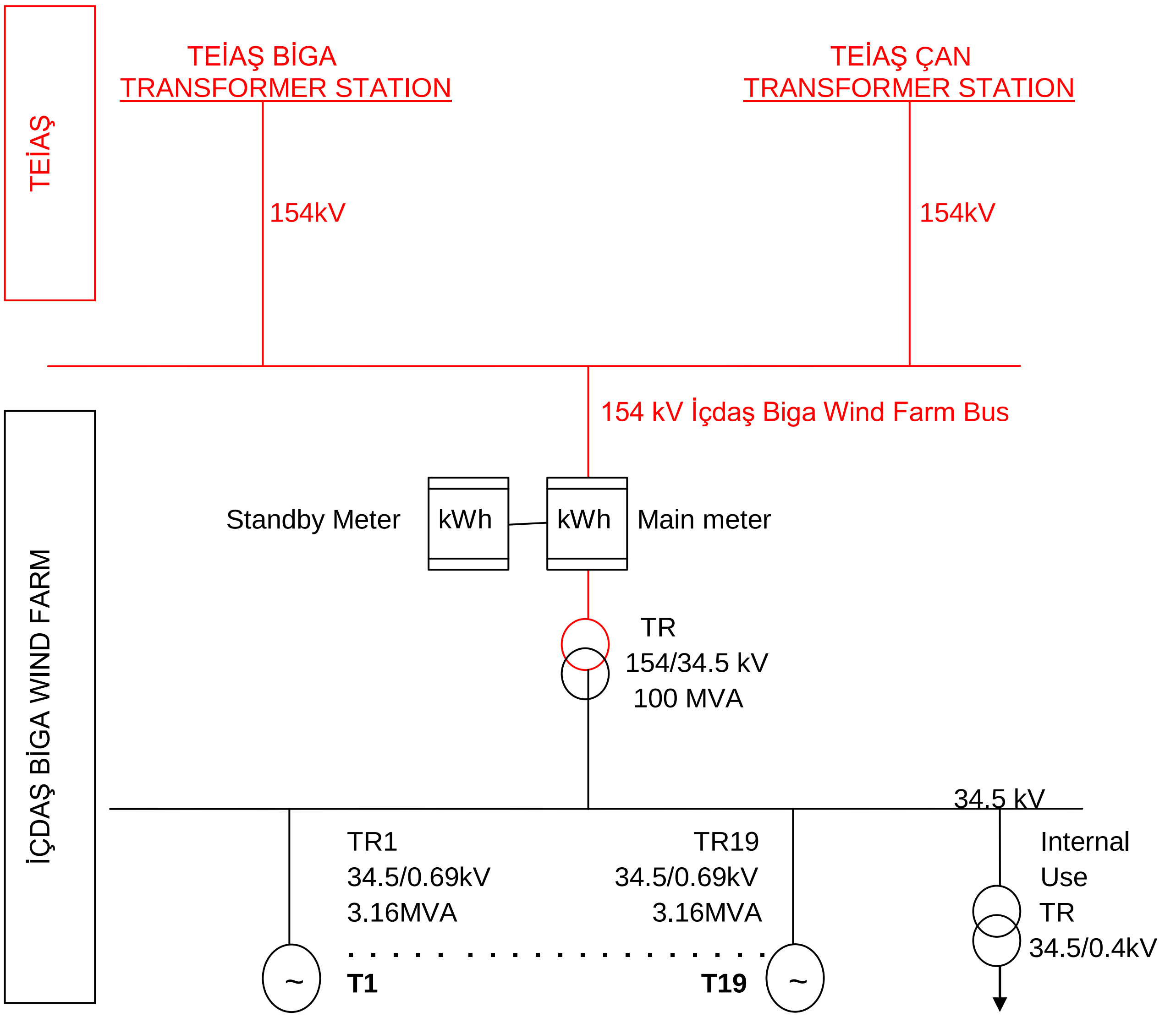

Figure 2 – Single Line Diagram of the Power Plant

In the absence of the project activity, 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.

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	İçdaş Çelik Enerji Tersane ve Ulaşım San. A.Ş Carbon Clear	No

A.5. Public funding of project activity

No public funding is used for the project activity.

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

B.1. Reference of methodology and standardized baseline

The approved methodology to apply to the project is ACM0002, “Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources”, version 16.0
http://cdm.unfccc.int/filestorage/0/X/6/0X6IERWMG92J7V3B8OTKFSL1QZH5PA/EB81_repan09_ACM0002_ver16.0_clean.pdf?t=aER8bm5wc2l4fDDA7HyIeg06i3djJBc0l5DB

The following methodological tools in line with the methodology are used:

- “Methodological Tool: Tool to calculate the emission factor for an electricity system”, Version 04.0
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

- “Methodological Tool: Tool for the demonstration and assessment of additionality”, Version 07.0.0
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

- “Guidelines on Common Practice”, Version 02.0
https://cdm.unfccc.int/Reference/Guidclarif/meth/meth_guid44.pdf

- “Guidelines on the Assessment Of Investment Analysis”, Version 05
https://cdm.unfccc.int/filestorage/e/x/t/extfile-20150817153802500-Reg_guid03.pdf/Reg_guid03.pdf?t=Vkx8bzN4bjVjfDAdMcDRcg5xJ6ZcilK2UDpd

B.2. Applicability of methodology and standardized baseline

According to UNFCCC (paragraph 28, decision 1/CMP.2), a renewable energy project activity can be classified as small-scale CDM project if the project activity have a maximum output capacity of 15 MW. The project output capacity is 60MW, so, the project activity is identified as large-scale and a large scale methodology, ACM0002, is applied. ACM0002 applies to project activities that include retrofitting, rehabilitation (or refurbishment), replacement or capacity addition of an existing power plant or construction and operation of a Greenfield power plant. Since, the project activity includes construction of a Greenfield wind power project, this methodology is applicable. The other applicability criteria and their justifications are listed at the table below.

Table 3 ACM0002 Applicability Conditions

Applicability conditions	**Justification**
This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing 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 proposed project activity involves the installation of a new power plant[2] for renewable electricity generation that will be delivered to the grid.
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 consists in the installation of a wind power plant[3]; therefore, the project activity complies with the activity condition and type of plant/unit.
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 is a green field power plant, thus, this criteria is not applicable.

[2] The Project site is a forest land prior to the Project activity, so the project is green field project.(Project Description Document)

[3] The electricity generation license.

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/m^2; 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/m^2; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m^2, 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 $W//m^2$; (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 $W//m^2$ 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.	The project activity is not a hydropower plant. The criteria are not assessed.

B.3. Project boundary

According to ACM0002, the spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system, which the Turkish electricity grid, that the VER project power plant is connected to.

The following diagram describes the project's spatial boundary:

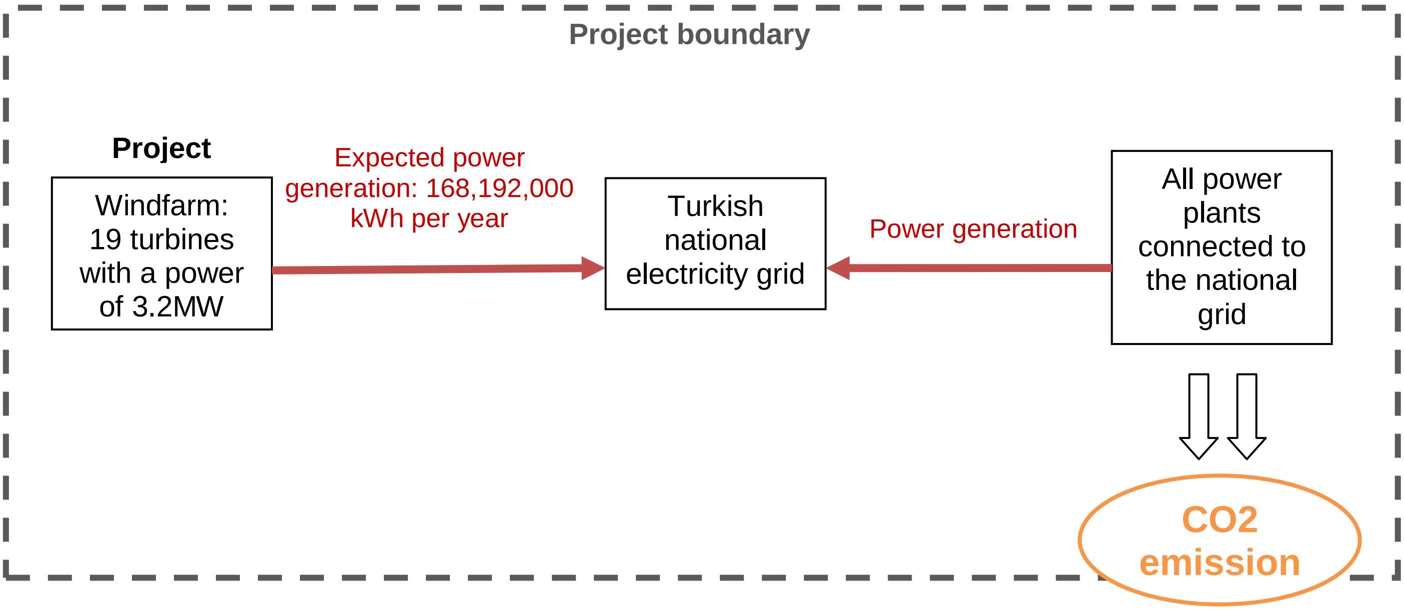

Figure 2 Project Boundary

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 4.

Table 4 Emission Sources

Source		Gas	Included	Justification/explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	According to ACM0002, CO_2 is included in the project boundary because it is a main emission source
		CH_4	No	According to ACM0002, CH_4 is not included in the project boundary because it is a minor emission source
		N_2O	No	According to ACM0002, N_2O is not included in the project boundary because it is a minor emission source
Project activity	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	No	The project is not a geothermal plant but a wind farm; these GHGs emissions should then not be considered.
		CH_4	No	
		N_2O	No	
	CO_2 emissions from combustion of fossil	CO_2	No	The project is neither a solar thermal power plant nor a
		CH_4	No	

Source		Gas	Included	Justification/explanation
	fuels for electricity generation in solar thermal power plants and geothermal power plants	N_2O	No	geothermal plant but a wind farm, these GHGs emissions should then not be considered.
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	The project is not a hydropower plant but a wind farm, these GHGs should not be considered.
		CH_4	No	
		N_2O	No	

B.4. Establishment and description of baseline scenario

The proposed project activity includes the installation of 19 wind turbines with rated power of 3.2MW each. The electricity generated will be delivered to the grid. Hence, according to the baseline methodology ACM0002 Version 16.0, point 23, since the project activity is the installation of a new grid-connected renewable power plant, the baseline scenario is as follows:

“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, as reflected in the combined margin (CM) calculations described in the ‘Tool to calculate the emission factor for an electricity system’.”

Looking at long-term trends for Turkish energy helps to establish the baseline scenario:

The demand of electricity in Turkey is increasing and it is expected to increase with an increase rate of between 4%-5% every year according to Turkish Electricity Transmission Company (TEIAS) Capacity Report, 2013-2017[4] even with the low demand scenario. The actual electricity demand between 2003 and 2012 is demonstrated at figure 2.

[4] Turkish Electricity Transmission Company (TEIAS) Capacity Report,2013-2017, p.20
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2013.pdf

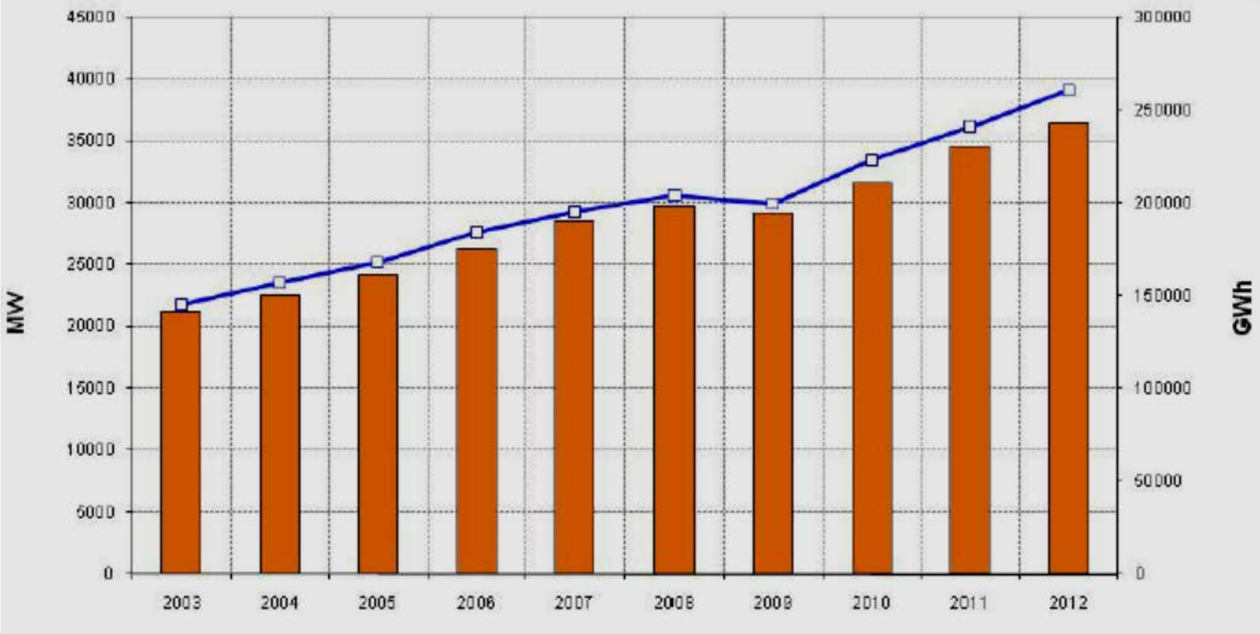

Figure 3 Turkey's electricity demand trend

If we look at the energy sources for electricity generation in Turkey, it is mainly based on fossil fuels such as natural gas and petrol: in 2008 their shares in the country energy production were respectively 32% and 29.5%, more than half o the total capacity. Moreover, Turkey's fossil fuel imports for energy generation rose up to 73% in 2008.[5] The share of thermal power plant capacity with respect to total capacity between 1990 and 2013 is listed in table 4. All these information show that in the baseline scenario (if the proposed project does not happen) the share of fossil fuel in Turkey energy generation would be higher.

[5] The official web site of Ministry of Energy and Natural Resources
http://www.enerji.gov.tr/index.php?dil=tr&sf=webpages&b=enerji&bn=215&hn=12&nm=384&id=384

Table 5 Energy Source Distribution in Turkish Electricity System[6]

Year	Thermal	Hydro	Geothermal + Wind	Total	Share Of Thermal
1990	9535.8	6764.3	17.5	16317.6	58.4
1991	10077.8	7113.8	17.5	17209.1	58.6
1992	10319.9	8378.7	17.5	18716.1	55.1
1993	10638.4	9681.7	17.5	20337.6	52.3
1994	10977.7	9864.6	17.5	20859.8	52.6
1995	11074.0	9862.8	17.5	20954.3	52.8
1996	11297.1	9934.8	17.5	21249.4	53.2
1997	11771.8	10102.6	17.5	21891.9	53.8
1998	13021.3	10306.5	26.2	23354.0	55.8
1999	15555.9	10537.2	26.2	26119.3	59.6
2000	16052.5	11175.2	36.4	27264.1	58.9
2001	16623.1	11672.9	36.4	28332.4	58.7
2002	19568.5	12240.9	36.4	31845.8	61.4
2003	22974.4	12578.7	33.9	35587.0	64.6
2004	24144.7	12645.4	33.9	36824.0	65.6
2005	25902.3	12906.1	35.1	38843.5	66.7
2006	27420.2	13062.7	81.9	40564.8	67.6
2007	27271.6	13394.9	169.2	40835.7	66.8
2008	27595.0	13828.7	393.5	41817.2	66.0
2009	29339.1	14553.3	868.8	44761.2	65.5
2010	32278.5	15831.2	1414.4	49524.1	65.2
2011	33931.1	17137.1	1842.9	52911.1	64.1
2012	35027.2	19609.4	2422.8	57059.4	61.4
2013	38648.0	22289.0	3070.5	64007.5	60.4

B.5. Demonstration of additionality

For the demonstration of additionality, the ACM0002 version 16.0 refers to the “Tool for demonstration and assessment of additionality”, Version 07.0.0.

The steps to demonstrate that the project activity is additional are as follows:

Step 0: Demonstration whether the proposed project activity is the first-of –its-kind

The project activity is not the first-of-its kind and this step is optional. Thus, this step is not considered.

---

[6] Turkish Electricity Transmission Company (TEIAS), Electricity Statistics
http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/kguc(1-13)/1.xls

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 proposed project activity includes the installation of 19 wind turbines with rated power of 3.2MW each. The electricity generated will be delivered to the grid. Realistic and credible alternatives scenarios considering the project owner are identified. The alternatives and their definitions are:

- **The project activity is undertaken without being registered as a VER project activity.**

  This project activity is possible to be undertaken without being registered under Gold Standard as a VER project. There is no legal or technical restriction for project owners to generate VERs from wind farms. The financial feasibility of this alternative will be analysed in Step 2.

- **The project activity not carried out and the electricity demand is met by other power plants connected to the grid.**

  Since this is a private investment, the project owner has the right to chose not to invest in the project. Thus, this alternative is viable.

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

Electricity generation is governed by the Electricity Market Law in Turkey. All the public and private entities who comply with the rules can get electricity generation licence. The laws applicable for wind farm projects are as follows:

(1) Electricity Market Law[7]
(2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[8]
(3) Environment Law[9]

The project owner has a licence of generating electricity from wind power for 49 years in Biga, Çanakkale. Moreover, the project is in consistent with environmental laws. The electricity licence and the document showing that the project does not require an Environmental Impact Assessment (EIA) are provided to the DOE for validation purposes. This alternative is valid.

If the project activity is not carried out, there will no laws or regulations to comply with. Thus, the second alternative will be consistent with mandatory laws and regulations.

The schedule of the project activity is provided in table 6.

[7] http://www3.epdk.org.tr/documents/elektrik/mevzuat/kanun/Elk_Kanun_6446.doc

[8] http://www3.epdk.org.tr/documents/elektrik/mevzuat/kanun/Elk_Kanun_Yek_Kanun.doc

[9] http://www.mevzuat.gov.tr/MevzuatMetin/1.5.2872.pdf

Table 6 Schedule of the Project Activity[10]

Date	Activity
22.04.2011	Bidding Invitation from TEİAŞ for the electricity generation licence. Issuance of the initial license
19.08.2011	Issuance of document that the project does not require EIA
11.01.2012	Issuance of Electricity Generation License
07.02.2012	Board decision on consideration of carbon finance
11.01.2012	Issuance of Electricity Generation License
01.04.2012	Agreement with the Carbon Project Developer
24.05.2013	Date of Local Stakeholder Meeting
10.07.2013	Remark of Directorate Of Nature Conservation And National Parks on the cancellation of the six turbines and precautions on bird migration routes.
9.12.2014	The investment decision date and the project start date (agreement with the equipment provider)
10.12.2014	Completion of the Energy Assessment Report
15.12.2014	1st Loan Agreement
27.01.2015	Revision of the Electricity Generation Licence according to the new turbine capacities.
27.03.2015	2nd Loan Agreement
25.03.2015	Construction Agreement
18.09.2015	System usage agreement
16.10.2015	Certificate of provisional acceptance of the Project(start date of the crediting period)

Based on the guidance of the tool for the demonstration and assessment of additionality, an investment analysis has been carried out.

Step 2: Investment Analysis

This step consists in determining whether our project is the less economically attractive or is not economically feasible without the revenue from the VERs.

To conduct the investment analysis, following sub-steps are used:

Sub-step 2a Determine appropriate analysis method

According to the "*Tools for the demonstration and assessment of additionality*" three analysis methods are suggested: simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III).

[10] The references of the activities will be provided to the DOE for validation.

As the project activity generates other income than carbon credits due to the sale of electricity to the grid, simple cost analysis (option I) cannot be applied. Benchmark analysis (option III) is selected for this project activity.

Outcome Of Sub-Step 2a- *Benchmark Analysis method is used.*

Sub-step 2b Option III. Apply benchmark analysis

For the benchmark analysis, the IRR is considered the most suitable indicator according to the project type. The equity IRR will be used, since it includes all in and out cash flows.

According to the "Tool for the demonstration and assessment of additionality" (Version 07.0.0) option b was used to determine the discount rate and benchmark used for the benchmark analysis.

(b) Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required from for the country and the type of project activity concerned) , based on bankers views and private equity investors/funds' required return on comparable projects.

The threshold returns are based on comparable investments adjusted for risk and transaction costs that are more difficult to quantify. In Turkey a typical developer of wind expects equity IRRs of 15 percent according to World Bank, - Project Appraisal Document on a IBRD Loan and a Proposed Loan from Clean Technology Fund to TSKB and TKB with the Guarantee of Turkey, May 2009(page 82, table 11.5)[11]

The project terminal value is assumed to be 0 since project owner does not plan to receive any revenue from the sale of equipment at the end of the project lifetime. The increase in energy costs is assumed to be 4% a year.

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

According to the "Guidelines on the assessment of investment analysis" (Version 05), the following actions were taken into account:

• The investment analysis period was for 20 years according to the guidelines; it mentions the following: "*In general a minimum period of 10 years and maximum of 20 years should be appropriated*". Therefore, the investment analysis period was for 20 years.
• The equity IRR before taxation of the project is calculated.

For the economic analysis, the following data was used:

[11] Available at: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/05/11/000333037_20090511030724/Rendered/PDF/468080PAD0P112101Official0Use0Only1.pdf

Table 7 Parameters used for the IRR calculation

Parameter	Amount	Unit	Reference
Total Investment	-	-	Financial Assessment Document prepared by project owner.
Saleable Net electricity Generation	168,192	MWh/Year	Financial Assessment Document prepared by project owner.
Total Power Capacity	60	MW	Electricity Generation License
Capacity ratio	32	%	The actual working conditions
Period of Assessment	20	Years	The expected lifetime of the main equipment[12]
Energy Sale Price (average)	6.75	c/kWh	YEKDEM Energy Prices[13] + estimate
Expected VER price	7	USD /tCO2e	The market average during time of project planning

The Wind Farm Project cash flow shows that the equity IRRs for the development of the project activity (with and without considering VER revenues) are as follows:

Table 8 Equity IRR Values (before tax)

Scenario	Equity IRR
Without VER revenues	5%
With VER revenues	8%

Source: Financial Assessment Document

The equity IRR of the project without the VER's income 5% is below the financial benchmark (15%), demonstrating that the project activity by itself is not economically feasible. As a result of the investment analysis it is concluded that the project cannot be considered as a financially attractive project, and that the financial benefit derived from the VER revenues will alleviate or will help overcome the financial hurdles described.

Sub-step 2d: Sensitivity analysis

In the Guidance on the Assessment of Investment Analysis (Version 05), paragraph 20 mentions the following:

[12] Design Evaluation Conformity Statement by Tüv Nord.

[13] Renewable Energy Sources Supporting Mechanism(YEKDEM)
http://www3.epdk.org.tr/documents/elektrik/duyuru/yeklistesi/2016/Elk_Duyuru_2016_NihaiYeKListesi.xlsx.xlsx

Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude).

For the last paragraph, the explanation of each variable that it is used in sensitivity analysis is the following:

- Investment cost
- Operational Costs
- Electricity Sale Price

Table 9 Fluctuating Indicator Values

Fluctuating indicators	Unit	-10%	Initial scenario	+10%
Investment Costs	-	-	-	-
Operational Costs	$/ year	909,239	1,010,266	1,111,293
Electricity Sale Price*	¢/kWh	6.08	6.75	7.43

*Electricity sale price is demonstrated as the average unit price.

Table 10 Fluctuating indicators impacts on equity IRR

Equity IRR(before tax) without VER revenue	-10%	Initial scenario	10%
Investment Costs	-	-	-
Operational Costs	5.5	5	4.6
Electricity Sale Price	-1	5	10.4

The primary objective of the sensitivity analysis is to determine the likelihood of the occurrence of a scenario other than the scenario presented, in order to cross-check the suitability of the assumptions used in the development of the investment analysis. The indicators above will then be examined based on the past trends and forecasts.

- **Investment Costs**

Bearing in mind the 15 % benchmark, the equity IRR would reach 15% when the investment costs cut by 22%. With the largest proportion of capital expenditure being wind turbine technology, a reduction in spending of this magnitude will directly affect the project’s basic activity such as installed capacity and annual electricity generation and in turn the sales revenue that can be generated as a result. Therefore, a 22% reduction in investment costs is not feasible if the project owner is to achieve the proposed activities.

- **Operational Costs**

If the annual operation and maintenance costs were reduced 80%, the equity IRR value increases to 8.7%, still below the benchmark threshold. In real case, it is not feasible to reduce operational cost because maintenance cost is the main component which cannot be reduced a lot. Labour cost contributes of only 14% of the total operational costs. It is concluded that the annual operational costs is not a sensitive indicator that can be presumed to impact the project yield in a positive manner.

- **Electricity Sale Price**

In order to reach the threshold rate keeping the electricity production amount as it is, the feed-in tariff of the project has to be 8.10 $cent/kWh, on average over the 20 year life time. This would suggest an increase rate of 20% of the officially defined maximum feed-in-tariff which is 7.3 $cent/kWh + 1.4$cent/kWh for domestic contribution.
As the Renewable Energy Law had come into effect by 2005, 5.5 €cent/kWh of tariff rate for purchase guarantee has been established. By January 10th, 2011, it has been revised as 7.3 $cent/kWh which is 5.65 €cent/kWh as calculated by the exchange rate of the day which is EUR/USD: 1.2907[14] which underlines a tariff increase of 2.7%. In a period of past 6 years, considering the tariff to increase 2.7%, it is an unrealistic forecast to expect an increase of 20% for the feed-in-tariff at least for the next 2 decades.

In conclusion the project is in accordance with the requirements of this step and it is demonstrated that the project activity is additional; this conclusion is supported by the following:

- The equity IRR without the VER's incentives (5%) it's below the benchmark (15%).
- In the sensitivity analysis the variables that have the most impact in the IRR of the project are the electricity sale price. However it is clearly demonstrated that in the most positive scenario when the electricity sale price is increased by 10%, the equity IRR only increase to 10.4%, which is a smaller figure in comparison with the benchmark, for this reasons it is demonstrated the additionality of the project.

So, developing the project without the VERs incentive is not possible. Therefore, the additionality of the project activity is clearly demonstrated based on the Investment analysis, Step 2 and the baseline of the project activity is the continuation of the current situation.

Outcome of Step 2*: As shown in the comparison tables above, the project activity is not economically/financially attractive. The equity IRR of the project without the incentives is smaller than the benchmark of 15%. Also in the sensitivity analysis, when the electricity sale price is increased by 10%, the project IRR does not surpass the benchmark.*

Step 3: Barrier analysis

The barrier analysis has not been carried out.

[14] Central Bank of the Republic of Turkey
http://www.tcmb.gov.tr/wps/wcm/connect/TCMB+TR/TCMB+TR/Main+Menu/Istatistikler/Doviz+Kurlari/Gosterge+Niteligindeki+Merkez+Bankasi+Kurlarii

Step 4: Common practise analysis

According to the tool for demonstration and assessment of additionality" version 7.0.0, if the proposed VER project activity applies measure(s) that are listed in the definitions section of the tool section Sub-step 4b will be valid.

Sub-step 4a: The proposed VER project activity applies measure that are listed in the definitions section

"Guidelines on common practice", Version 02.0 is applied.

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

The capacity of the project activity is 60MW. Therefore the applicable capacity range is 30-90MW. This range will be applied for the following steps.

Step 2: identify similar projects (both VER and non-VER) which fulfil all of the following conditions:

- The projects are located in the applicable geographical area : the applicable area is Turkey,
- The projects apply the same measure as the proposed project activity : Power generation based on renewable energy,
- 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: A technology switch measure is not implemented.
- The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas as the proposed project plant: the plants are producing electricity and are connected to the grid.
- The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1 : our capacity range is 30 – 90MW
- The projects started commercial operation before the project design document is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity: since the starting date of the project activity is October 2015, all the projects which are already generating electricity.

The list of projects complying with the above criteria is demonstrated in the financial assessment document, which will be provided to the DOE by validation.

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

From all the power plants in Step 1, there are 45 power plants which are non-VER project, therefore, N_{all} =45.

Step 4: Within plants identified in Step 3, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number $N_{diff.}$

There are 43 power plants among N_{all} have a different technology than the technology applied in the proposed project activity (Wind Farm). Therefore, N_{diff}= 43

Step 5: 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.

According to the last steps, the calculation of the Factor F is the following:

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

Where:

$N_{all} = 45$
$N_{diff} = 43$
Therefore, F = 1- (43/45) = 0.044

According to "Guidelines on Common Practice" (Version 02.0.) if the value of the F factor is more than 0.2 and the difference between N_{all} and N_{diff} is more than 3, the project activity is common practice. The F factor is 0.044 and the difference between N_{all} and N_{diff} is 2, therefore, the project activity is not common practice.

Outcome of Step 4: *As a result of common practice analysis the project activity is not regarded as "common practice", the project activity is additional.*

B.6. Emission reductions

B.6.1. Explanation of methodological choices

B.6.1.1. Project Emissions

According to the consolidated methodology ACM0002 Version 16.0.0 "For most renewable power generation project activities, PEy = 0. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:"

$PE_y = PE_{FF,y}$,$+ PE_{GP,y} + PE_{HP,y}$

Where:

PE_y = Project emissions in year y (tCO_2e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO_2e/yr)

Since the project activity is a renewable energy generation project harnessing wind power, it has no fossil-fuel consumption, doesn't result in water reservoir or release non-condensable gases.

Consequently;

$PE_{FF,y}$,+$PE_{GP,y}$ + $PE_{HP,y}$ = 0;

Therefore;

PE_y = 0 tCO_2e/yr

B.6.1.2. Baseline Emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that existing grid-connected power plants and the addition of new grid-connected power plants would have generated all project electricity generation above baseline levels. The baseline emissions are to be calculated as follows:

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

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VER project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

Calculation of $EG_{PJ,y}$

Since the project activity is the installation of a Greenfield power plant, then:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VER project activity in year *y* (MWh/yr)
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

Thus,

$EG_{PJ,y}$ = 168,192 MWh/year

Calculation of $EF_{grid,CM,y}$

In order to calculate the $EF_{Grid,CM,y}$ Tool to calculate the emission factor for an electricity system, Version 04 is used. There six major steps for the calculations. The details and results of each step are as follows:

Step 1: Identify the relevant electricity systems

The project electricity system is the national Turkish grid with all power plants connected to the system.
For the purpose of determining the operating margin emission factor, the CO_2 emission factor(s) for net electricity imports from a connected electricity system are calculated as 0 t CO_2/MWh. Moreover, electricity exports are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

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

Only grid power plants are included in the calculation.

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

The simple Operating Margin (OM) method has been used to determine the OM as low-cost/must-run resources constitute less than 50% of total grid generation in average of the five most recent years as shown in Table 5.

Table 61Share of low-cost/must run resources in total Turkish grid generation[15]

Year	Electricity generated by fossil fuel-fired plants (GWh)	Electricity generation by low-cost/must run plants* (GWh)	Total Electricity Generation (GWh)	% of Low - Cost/Must Run
2009	156,923.4	37,889.5	194,812.9	19,44917
2010	155,827.6	55,380.1	211,207.7	26,22068
2011	171,638.3	57,756.8	229,395.1	25,17787
2012	174,871.7	64,625.1	239,496.8	26,9837
2013	171,812.5	68,341.5	240,154.0	28,45736

* Low-Cost/Must run plants are hydro, wind and geothermal power plants in Turkey. Coal fired plants are not defined as a must run resource.

[15] TEİAS(Turkish Electricity Transmission Company) http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/kgucunkullan%C4%B1m(14-22)/14.xls

Ex-ante option is chosen for the calculation of the simple OM. The emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, a 3-year generation-weighted average (2012, 2011 and 2010), based on the most recent data available at the time of submission of the VER-PDD to the DOE for validation is used.

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

The Simple Operating Margin (OM_{simple}) emission factor ($EF_{Grid,OMsimple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low operating cost and must run power plants.

Due to the lack of information available on each power unit, Option B has been chosen to calculate OM_{simple}. Option B is used, since the following conditions are met:

(a) The necessary data for Option A is not available; and
(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
(c) Off-grid power plants are not included in the calculation.

Thus, as per the *Tool to calculate the Emission Factor for an electricity system*, the following formula applies:

$$EF_{Grid,OM,simple,y} = \frac{\sum_i (FCi,y * NCVi,y * EFCO2,i,y)}{EGy}$$

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 (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,\ i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i = All fossil fuel types combusted in power sources in the project electricity system in year *y*
y = The relevant year as per the data vintage chosen (2010, 2011, 2012).

For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units, and including electricity imports to the grid. Electricity imports are treated as one power plant m.
$FC_{i,y}$ for each type of fuel consumed in the project electricity system in 2010, 2011 and 2012 are listed in Table 6.

Table 72 Fuel consumption values[16]

	Fuel Consumption(ton or 10^3 m^3)		
Fuel Type	**2010**	**2011**	**2012**
Natural Gas	21,783,414	22,804,587	23,090,121
Fuel Oil	891,782	531,608	564,796
Diesel Oil	20,354	15,047	176,379
Coal	7,419,703	10,574,434	12,258,462
Lignite	56,689,392	61,507,310	55,742,463

Net calorific value (energy content) of each fossil fuel type calculated, since it was not published. The heating values (Tcal) for each type of fuel are given by TEİAŞ. The heating values are transformed into GJ by multiplying with 4184. Then the total fuel consumptions for the specific type of fuel(FCi,y)are divided by the heating value to find out NCVi,y. Ex ante option is chosen, thus the most recent three historical years (2012, 2011 and 2010) data is used.

Table 83 Net Calorific Values for fossil fuels[17]

	NVC(GJ/Unit)		
Fuel Type	**2010**	**2011**	**2012**
Natural Gas	37.3557	37.0731	36.9231
Fuel Oil	40.2040	41.5550	41.6682
Diesel Oil	43.0614	43.1219	44.6832
Lignite	22.3004	22.7777	24.3256
Coal	7.1260	7.2929	7.0246

Due to the lack of published CO_2 emission factors of fossil fuel types used in Turkey, the values are gathered from the 2006 IPCC Guidelines on National GHG Inventories default values at the lower limit of the uncertainty at a 95%confidence interval. Since ex-ante option is chosen the values will not be monitored during the crediting period.

[16] TEİAS(Turkish Electricity Transmission Company)

http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/yak%C4%B1t48-53/49.xls

[17] TEIAS(Turkish Electricity Transmission Company)

http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/yak%C4%B1t48-53/51.xls

Table 94 CO2 values for fossil fuels[18]

Fuel Type	EF(tCO_2/GJ)
Natural Gas	0.0543
Fuel Oil	0.0755
Diesel Oil	0.0726
Lignite	0.0909
Coal	0.0895

$EG_{y,}$ the last parameter used for the calculation of simple OM, is gathered from Turkish Electricity Transmission Company. As the tool advices not to include low-cost/must-run power plants/units, only the electricity generation of thermal power plants are included. To find out the net thermal electricity generation, the gross thermal electricity generation within Turkey and electricity imports are added.
Ex ante option is chosen, thus the most recent three historical years (2012, 2011 and 2010) data is used. The values are listed in table 15 below.

Table 105 Net electricity generated in Turkish Grid[19]

Year	EG_y (MWh)
2012	180,698,395
2011	176,194,117
2010	156,971,410

The results of the simple OM calculations are below. The details of the data and calculations will be provided to the DOE in Emission_Calculations.xls document.

Table 116 Summary of Operating Margin factors

	2010	2011	2012
$EF_{Grid,OMsimple,y}$	0.6274	0.6240	0.6139
$EF_{Grid,OMsimple,y}$ (average)	**0.6218**		

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

As per Step 5 of the *Tool to calculate the Emission Factor for an electricity system*, Option 1 has been used to calculate the build margin emission factor that will be valid for the first crediting period. Capacity additions from retrofits of power plants are not be included in the calculation of the

[18] IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 2.2 of Chapter 2 of Vol. 2(Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

[19] Turkish Electricity Transmission Company(TEİAŞ), Electricity Statistics

http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/uretim%20tuketim(23-47)/44.xls

http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/ithalat-ihracat(54-58)/56.xls build margin emission factor.

The sample group of power units *m* used to calculate the build margin should determined as per the following procedure:

(a) Identify the set of five power units, excluding power units registered as VER project activities, that started to supply electricity to the grid most recently ($SET_{5\ units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as VER project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as VER project activities, that started to supply electricity to the grid most recently and that comprise 20 per cent of AEG_{total} (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\ per\ cent}$) and determine their annual electricity generation ($AEG_{SET\geq 20\ per\ cent}$, in MWh);

(c) From $SET_{5\ units}$ and $SET_{\geq 20\ per\ cent}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

There were not publically available data about the exact commissioning dates of most recently commissioned power plants. However, it is can be proved that $SET_{\geq 20\ per\ cent}$ power units comprise the larger annual electricity generation than $SET_{5\ units}$. In 2013, the total capacity increase in Turkey was %12.2[20] including VER project activities, which is less than %20 of the total capacity. Thus, it is concluded that SET_{sample} is $SET_{\geq 20\ per\ cent}$ power units. The list of power units included in BM calculations is demonstrated in the Appendix 4.

The oldest power plant of the sample started to supply electricity to the grid in 2010, which is not more than 10 years, thus SET_{sample} is used to calculate the build margin.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year 2012 for which electricity generation data is available, and is calculated as follows:

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

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 electricity generation data is available.

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) is determined with the following formula, as for a power unit m only data on electricity generation and the fuel types used is available:

[20] Turkish Electricity Transmission Company(TEİAŞ), Electricity Statistics

http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/kguc(1-13)/1.xls

$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} * 3,6}{\eta_{m,y}}$

Where:

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (tCO2/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* (ratio)
m	=	All power units serving the grid in year *y* except low-cost/must-run power units
y	=	The relevant year

The EF_{CO2} for different type of fuels are gathered from 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Average net energy conversion efficiency of specific power units are not provided thus the approximate values for Turkish power plants from Turkish Electricity Generation Company are used. (Table 11)

Table 127 Parameter of each fuel type for BM calculations

Fuel Type	EF_{CO2}(tCO2/GJ)[21]	η[22]	EF_{EL}
Natural Gas	0.0543	58%	0.3370
Fuel Oil	0.0755	55%	0.4942
Coal	0.0895	42%	0.7671
Lignite	0.0909	47%	0.6963

The resulting $EF_{grid,BM,y}$ is 0.3566 tCO_2/MWh.

Step 6: Calculate the combined margin emissions factor

After calculation of simple operating margin and build margin emission factors, the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is calculated by using the weighted average CM method.

The combined margin emissions factor is calculated as follows:

$EF_{grid,CM,y} = (EF_{grid,OM,y} * W_{OM}) + (EF_{grid,BM,y} * W_{BM})$

Where:

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

It is advised to use W_{OM} = 0.75 and W_{BM} =0.25 for wind and solar power generation projects for the first crediting period and for subsequent crediting periods. Thus the grid emission factor is:

[21] IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 2.2 of Chapter 2 of Vol. 2(Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

[22] http://www.uevf.com.tr/uevf1/sunumlar/ot04-04.pdf

$EF_{grid,CM,y}$ = (0.6218* 0.75) + (0.3566 * 0.25) = **0.5555 tCO_2/MWh**.

B.6.1.3. Leakage

According to the consolidated methodology ACM0002 Version 16.0, "No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected."

Therefore, $LE_y = 0$ tCO_2e/yr.

B.6.1.4. Emission Reductions

Emission reductions are calculated as follows:

$$\boldsymbol{ER_y = BE_y - PE_y}$$

Where:

ER_y	=	Emission reductions in year *y* (t CO_2e/yr)
BE_y	=	Baseline emissions in year *y* (t CO_2/yr)
PE_y	=	Project emissions in year *y* (t CO_2e/yr)

Since $PE_y = 0$ and $LE_y = 0$

Then $ER_y = BE_y$

Thus,

$BE_y = EF_y \times EG_y$

All of the calculations and relevant data related with emission reductions will be provided to the DOE for validation.

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$\boldsymbol{EG_{,y}}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant to the grid in year *y*

Source of data	Project economic feasibility document prepared by project owner.
Value(s) applied	168,192 MWh/year
Choice of data or Measurement methods and procedures	The data is calculated by theoretical assumptions related with the equipment specifications.
Purpose of data	Baseline emission calculations
Additional comment	-

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for grid connected power generation in year *y*
Source of data	
Value(s) applied	0.5555 tCO_2/MWh
Choice of data or Measurement methods and procedures	The parameter is calculated according to the Tool to calculate the emission factor for an electricity system', Version 04.0. The details of calculation method is provided at section B.6
Purpose of data	Baseline emission calculations
Additional comment	-

Data / Parameter	$FC_{i,y}$
Unit	Tonnes or $10^3 m^3$
Description	Amount of fossil fuel type consumed in the grid in year y
Source of data	Turkish Electricity Transmission Company (TEİAŞ), Electricity Statistics http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/yak%C4%B1t48-53/49.xls
Value(s) applied	(see table below)
Choice of data or Measurement methods and procedures	No plant specific data was available, thus the total fuel consumptions of all plants connected to the grid with the same fuel type are used. Ex ante option is chosen, thus the most recent three historical years (2012, 2011 and 2010) data is used.
Purpose of data	$EF_{Grid, CM, y}$ calculation
Additional comment	-

	Fuel Consumption(ton or 10^3 m^3)		
Fuel Type	**2010**	**2011**	**2012**
Natural Gas	21,783,414	22,804,587	23,090,121
Fuel Oil	891,782	531,608	564,796
Diesel Oil	20,354	15,047	176,379
Coal	7,419,703	10,574,434	12,258,462
Lignite	56,689,392	61,507,310	55,742,463

<table>
<tr><td>Data / Parameter</td><td>$NCV_{i,y}$</td></tr>
<tr><td>Unit</td><td>GJ/mass or volume unit</td></tr>
<tr><td>Description</td><td>Net calorific value (energy content) of fossil fuel type i in year y in Turkish grid.</td></tr>
<tr><td>Source of data</td><td>Turkish Electricity Transmission Company(TEİAŞ), Electricity Statistics
http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/yak%C4%B1t48-53/51.xls</td></tr>
<tr><td>Value(s) applied</td><td>
<table>
<tr><th></th><th colspan="3">NVC(GJ/Unit)</th></tr>
<tr><th>Fuel Type</th><th>2010</th><th>2011</th><th>2012</th></tr>
<tr><td>Natural Gas</td><td>37.3557</td><td>37.0731</td><td>36.9231</td></tr>
<tr><td>Fuel Oil</td><td>40.2040</td><td>41.5550</td><td>41.6682</td></tr>
<tr><td>Diesel Oil</td><td>43.0614</td><td>43.1219</td><td>44.6832</td></tr>
<tr><td>Lignite</td><td>22.3004</td><td>22.7777</td><td>24.3256</td></tr>
<tr><td>Coal</td><td>7.1260</td><td>7.2929</td><td>7.0246</td></tr>
</table>
</td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>The heating values (Tcal) for each type of fuel are given by TEİAŞ. The heating values are transformed into GJ by multiplying with 4184. Then the total fuel consumptions for the specific type of fuel($FC_{i,y}$)are divided by the heating value to find out $NCV_{i,y}$. Ex-ante option is chosen, thus the most recent three historical years (2012, 2011 and 2010) data is used.</td></tr>
<tr><td>Purpose of data</td><td>$EF_{Grid, CM, y}$ calculation</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

Data / Parameter	**$EF_{CO2,i,y}$**
Unit	tCO_2/GJ
Description	CO_2 emission factor of fossil fuel type *i* used in year *y* in Turkish grid.
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 2.2 of Chapter 2 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf
Value(s) applied	**Fuel Type** / **EF(tCO_2/GJ)**: Natural Gas: 0.0543 Fuel Oil: 0.0755 Diesel Oil: 0.0726 Lignite: 0.0909 Other Bituminous Coal: 0.0895
Choice of data or Measurement methods and procedures	The values were given with the unit of $kgCO_2/TJ$ by IPCC. They are converted to tonne CO_2/GJ by dividing to 1,000,000. Ex ante option is chosen, will be monitored once.
Purpose of data	$EF_{Grid, CM, y}$ calculation
Additional comment	-

Data Unit / Parameter:	$\eta_{m,y}$
Data unit:	Ratio
Description:	Average net energy conversion efficiency of power unit m in year y in Turkish grid
Source of data:	Electricity Generation Company (EÜAŞ) http://www.uevf.com.tr/uevf1/sunumlar/ot04-04.pdf
Value applied:	<table><tr><th>Fuel Type</th><th>η</th></tr><tr><td>Natural Gas</td><td>58%</td></tr><tr><td>Fuel Oil</td><td>55%</td></tr><tr><td>Lignite</td><td>42%</td></tr><tr><td>Coal</td><td>47%</td></tr></table>
Justification of choice of data or description of measurement methods and procedures applied:	There were no plant specific data for energy conversion efficiency. Thus, approximate η values are used based on reference data.
Purpose of Data	$EF_{Grid, CM, y}$ calculation
Any comment:	-

B.6.3. Ex ante calculation of emission reductions

Baseline emissions

According to section B.6.1., the results of *EFgrid,OM,y* , *EFgrid,BM,y* and *EFgrid,CM,y* are listed in following table, the detailed calculation and references are shown in the Appendix.

***EFgrid,OM,y* (tCO2e/MWh)**	***EFgrid,BM,y* (tCO2e/MWh)**	***EFgrid,CM,y* (tCO2e/MWh)**
0.6218	0.3566	**0.5555**

According to the formula in Section B.6.1., the baseline emissions (*BEy*) of the project in a typical year are calculated as follows:

$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$ = 0.5555 tCO2e /MWh * 168,192 MWh = 93,428 tCO_2e/yr

Project emissions

According to B6.1, *PEy* = 0

Leakage

According to Section B.6.1., *LEy* = 0

Emission Reductions

According to the formula in Section B.6.1., the emission reductions (*ERy*) of the project in a typical year are calculated as follows:

$ER_y = BE_y$ = 116,784 tCO_2e/yr

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)
16.10.2015 -16.10.2016	70,115	0	0	70,115
17.10.2016- 16.10.2017	93,428	0	0	93,428
17.10.2017-16.10.2018	93,428	0	0	93,428
17.10.2018-16.10.2019	93,428	0	0	93,428
17.10.2019-16.10.2020	93,428	0	0	93,428
17.10.2020 -16.10.2021	93,428	0	0	93,428
17.10.2021-16.10.2022	93,428	0	0	93,428
Total	**630,680**	**0**	**0**	**630,680**
Total number of crediting years	7 years			
Annual average over the crediting period	**90,097**	**0**	**0**	**90,097**

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plan to the grid in year *y*
Source of data	Company records
Value(s) applied	168,192 MWh/year
Measurement methods and procedures	The electricity generation will be measured via a three phase electricity meter and a standby meter in case of failures of the main meter, which are in control of TEİAŞ. <table><tr><th></th><th>Type</th><th>Measuring accuracy</th><th>Serial Number</th></tr><tr><td>Main meter</td><td>LZQJ-XC-P2FB-BB-GPB-L4-080018-F50/Q</td><td>$\pm 1.29*10^{-2}$%[23]</td><td>5151999</td></tr><tr><td>Standby Meter</td><td>LZQJ-XC-P2FB-BB-GPB-L4-080018-F50/Q</td><td>$\pm 1.29*10^{-2}$%[24]</td><td>5151977</td></tr></table>
Monitoring frequency	The data will be measured continuously and recorded hourly and monthly.

[23] Certificate of calibration
[24] Certificate of calibration

QA/QC procedures	The data measured via main meter will be read every hour by the technicians and recorded on an excel file for the records of the project owner. In addition to company records, the hourly data is saved automatically on TEİAŞ's load dispatch centre's online system via remote reading of the meters. The monthly records of TEAIŞ and project owner will be used for crosschecking. The quality assurance of the meters are meters by annual periodic inspections, which includes; - Testing of the meters to confirm that the measurement accuracy within the allowed range. - Controlling of the measurement equipments - Physical control of the equipment The meters will be renewed every 10 years. The requirements of periodic inspections are gathered from the system usage agreement between TEİAŞ and project owner. Both meters are calibrated in 23.12.2014 and sanity test applied on 19.08.2015 for the main meter and on 10.06.2015 for the standby meter. The sanity tests will be applied every year.
Purpose of data	Baseline emission calculations
Additional comment	-

B.7.2. Sampling plan

Not applicable.

B.7.3. Other elements of monitoring plan

The only and the most important parameter of the monitoring plan is quantity of net electricity generation supplied by the project plan to the grid every year to calculate the emission reduction throughout the crediting period.

The monitoring of the net electricity generation will be online and continuous. The net electricity generation will be monitored via two meters, one main and one standby, and the metering will be recorded by TEİAŞ remotely. The hourly readings will be recorded by the technicians of the project owner every hour to the SCADA system and the readings of the TEAİŞ and project owner will be crosschecked for monthly invoicing.

In order to keep the monitoring system continuous and reliable there will be 15 people working with the following qualifications:

- Three workers will be at the project site for the first three years for the inception phase.
- Eight technicians who will work on three shifts and monitor the system and kept the records.
- Two management staff for operational control.
- Two workers for the maintenance.

The management structure is also demonstrated at Figure

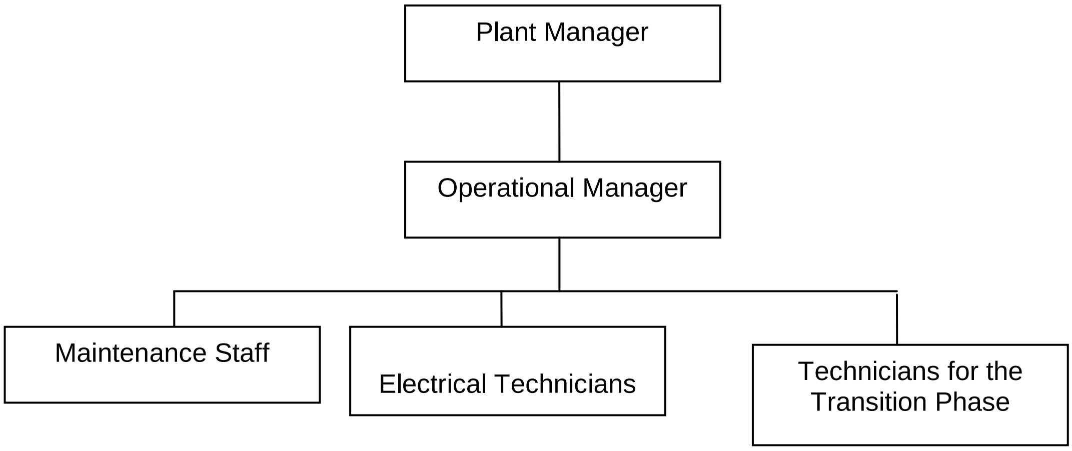

Figure 4 Management Structure

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

The baseline is established by Carbon Clear with the inputs from İçdaş Çelik Enerji Tersane ve Ulaşım San. A.Ş. The date of completion of application of methodology and standardized baseline is May 2015.

Carbon Clear Turkey
Yukarı Bahçelievler Mah.
59. Sok. No:15/1
06490 Çanaya, Ankara Turkey
Phone:+90 312 347 05 92
e-mail: turkey@carbon-clear.com

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

The start date of the project is 09.12.2014[25], when the agreement between the equipment supplier and project owner is signed.

C.1.2. Expected operational lifetime of project activity

The expected lifetime of the project activity is 20 years[26].

---

[25] Turbine Supply Agreement

[26] Design Evaluation Conformity Statement by Tüv Nord.

C.2. Crediting period of project activity

C.2.1. Type of crediting period

Renewable crediting type is chosen for the project activity. This is the first crediting period with twice renewable.

C.2.2. Start date of crediting period

The start date of crediting period is 16.10.2015[27], when the project starts to generate electricity.

C.2.3. Length of crediting period

7 years (16.10.2015- 16.10.2022)

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

The impacts of the project on environment are assessed in the Gold Standard Passport Document in Section F. Outcome Sustainability Assessment.

D.2. Environmental impact assessment

Çanakkale provincial directorate of environment and forestry assessed the project stated that the project does not require an environmental impact assessment (EIA) and concluded that with a formal notification on 19.08.2011. The document describing that the project does not require an EIA is provided to the DOE for validation.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

A local stakeholder consultation meeting is held on 24 May 2013 in Aksaz village, Biga , Çanakkale Turkey. The details of the meeting are provided in the Local Stakeholder Consultation Meeting Report.

E.2. Summary of comments received

All comments are provided in the Local Stakeholder Consultation Meeting Report.

E.3. Report on consideration of comments received

The assessment of all comments is provided in Local Stakeholder Consultation Meeting Report.

SECTION F. Approval and authorization

-

- - - - -

[27] Date of certificate of provisional acceptance of the Project.

Appendix 1. Contact information of project participants and responsible persons/ entities

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	İçdaş Çelik Enerji Tersane ve Ulaşım San. A.Ş
Street/P.O. Box	Güneşli
Building	-
City	İstanbul
State/Region	-
Postcode	34212
Country	Turkey
Telephone	+90 (0) 212 604 04 04
Fax	+90 (0) 212 550 20 24
E-mail	**icdas@icdas.com.tr**
Website	www. Icdas.com.tr
Contact person	
Title	Wind Power Plant Manager
Salutation	Mr.
Last name	Çokderin
Middle name	
First name	Gökhan
Department	-
Mobile	-
Direct fax	+90 (0) 286 334 54 11
Direct tel.	+90 (0) 286 334 50 50
Personal e-mail	Gokhan.cokderin@icdas.com.tr

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	Carbon Clear
Street/P.O. Box	Yukarı Bahçelievler Mah. 59. Sok. No.15/1
Building	No: 15/1
City	Ankara
State/Region	-
Postcode	06490
Country	Turkey
Telephone	+90 312 437 05 92
Fax	+90 312 437 05 92
E-mail	turkey@carbon-clear.com
Website	www.carbon-clear.com
Contact person	
Title	Project Manager
Salutation	Ms.
Last name	Cengiz
Middle name	
First name	Canet
Department	-
Mobile	-
Direct fax	-
Direct tel.	-
Personal e-mail	ccengiz@carbon-clear.com

Appendix 2. Affirmation regarding public funding

Not available.

Appendix 3. Applicability of methodology and standardized baseline

Applicability of methodology and standardized baseline is explained in section B.2.

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

The details of the emission reduction calculations are explained in section B.6. Here only the list of power units included in BM calculations is demonstrated.

Power Plants	*Installed Power (MW)*	*Firm Generation (GWh)*	*Fuel Type*	*Commissioning Date*
BEREKET ENERJİ ÜRETİM A.Ş. (BİOGAZ)	0.635	5	Biogas	2012
BEYKÖY (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	16.8	87	Biogas	2012
BEYPİ BEYPAZARI TARIMSAL ÜRETİM PZ. SN. A.Ş.	8.6	63	Biogas	2012
EKİM BİYOGAZ (EKİM GRUP ELEKTRİK ÜRETİM)	1.2	10	Biogas	2012
ES ES ESKİŞEHİR ENERJİ SAN. VE TİC. A.Ş.	2.042	15	Biogas	2012
GASKİ MERKEZ ATIK SU ARITMA TESİSİ	1.659	12	Biogas	2012
İZAYDAŞ (İZMİT ÇÖP)(Köseköy)	0.33	37	Biogas	2012
KESKİNOĞLU TAVUKÇULUK VE DAMIZLIK İŞLET.	6	71	Biogas	2012
ORTADOĞU ENERJİ (KÖMÜRCÜODA) (Şile/İSTANBUL)	2.83	67	Biogas	2012
PAMUKOVA YEN. EN. VE ELEK. ÜR. A.Ş.	1.4	10	Biogas	2012
SEZER BİO ENERJİ (KALEMİRLER ENERJİ ELEKTR.)	0.5	4	Biogas	2012
TRAKYA YENİŞEHİR CAM SAN. A.Ş.	6	45	Biogas	2012
EREN ENERJİ ELEKTRİK ÜRETİM A.Ş.	30	9,080	Coal	2012
GÖKNUR GIDA MAD. EN. İM. İT. İH. TİC. VE SAN. AŞ.	1.55	6	Coal	2012
BEKİRLİ TES (İÇDAŞ ELEKTRİK EN.)	600	4,320	Coal	2011
EREN ENERJĠ ELEKTRĠK ÜRETĠM A.ġ.		9,080	Coal	2010
KARKEY (SİLOPİ 1)	100.44	1,200	Fuel Oil	2011
MARDİN-KIZILTEPE (AKSA ENERJİ)	32.1	225	Fuel Oil	2011
DENİZ JEOTERMAL (MAREN MARAŞ ELEKTRİK)	24	191	Geothermal	2012
DENİZLİ JEOTERMAL (ZORLU DOĞAL ELEK. ÜR.A.Ş.)	15	105	Geothermal	2012
SİNEM JEOTERMAL (MAREN MARAŞ ELEKTRİK)	24	191	Geothermal	2012
AKKÖPRÜ (DALAMAN)	57.5	176	Hydro	2012
AKKÖY II HES (AKKÖY ENERJİ A.Ş.)	114.84	508	Hydro	2012
AKKÖY-ESPİYE HES (KONİ İNŞAAT SAN. A.Ş.)	8.912	22	Hydro	2012
ALPASLAN I (ELEKTRİK ÜRETİM A.Ş.)	80	418	Hydro	2012
ALPASLAN I (ELEKTRİK ÜRETİM A.Ş.)	80		Hydro	2012
ANAK HES (KOR-EN KORKUTELİ ELEK. ÜRET. SAN.)	3.76	9	Hydro	2012

ARAKLI-1 REG. VE HES(YÜCEYURT ENERJİ ÜRETİM)	10.203	28	Hydro	2012
ARAKLI-1 REG. VE HES(YÜCEYURT ENERJİ ÜRETİM)	13.067		Hydro	2012
ARPA REG. VE HES (MCK ELEKTRİK ÜRETİM A.Ş.)	32.412	44	Hydro	2012
ATAKÖY (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	5.525	11	Hydro	2012
AVCILAR HES (AVCILAR ENERJİ ELEKTRİK ÜRET.)	16.743	28	Hydro	2012
BAĞIŞTAŞ II HES (AKDENİZLİ ELEKTRİK ÜRETİM)	32.4	69	Hydro	2012
BALSUYU MENSUCAT SAN. VE TİC. A.Ş.	9.73	68	Hydro	2012
BEKTEMUR HES (DİZ-EP ELEKTRİK ÜRETİM LTD.)	3.492	11	Hydro	2012
BOYABAT BARAJI VE HES (BOYABAT ELEKTRİK)	513	830	Hydro	2012
BÜYÜKDÜZ HES (AYEN ENERJİ A.Ş.)	68.862	109	Hydro	2012
CAN 1 HES (HED ELEKTRİK ÜRETİM A.Ş.)	1.844	6	Hydro	2012
CUNİŞ REG. VE HES (RİNERJİ RİZE ELEKTRİK ÜR.)	2.8	21	Hydro	2012
CUNİŞ REG. VE HES (RİNERJİ RİZE ELEKTRİK ÜR.)	5.6		Hydro	2012
ÇAĞLAYAN HES (ÇAĞLAYAN HES ENERJİ ÜRETİM)	6	12	Hydro	2012
ÇARŞAMBA HES (ÇARŞAMBA ENERJİ ELEKTRİK)	11.31	36	Hydro	2012
ÇILDIR (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	15.36	20	Hydro	2012
ÇINAR-1 HES (AYCAN ENERJİ ÜRETİM TİC. VE SN.)	9.26	19	Hydro	2012
ÇUKURÇAYI HES (AYDEMİR ELEKTRİK ÜRETİM A.Ş.)	1.8	4	Hydro	2012
DOĞANKAYA HES (MAR-EN ENERJİ ÜRET. TİC.)	20.55	56	Hydro	2012
DUMLU HES (DUMLU ENERJİ ELEKTRİK ÜRETİM)	3.982	5	Hydro	2012
EGER HES (EGER ELEKTRİK ÜRETİM LTD. ŞTİ.)	1.92	6	Hydro	2012
ERİK HES (ELEKTRİK ÜRETİM A.Ş.)	6.48	21	Hydro	2012
ERMENEK (ELEKTRİK ÜRETİM A.Ş.)	151.2	817	Hydro	2012
ERMENEK (ELEKTRİK ÜRETİM A.Ş.)	151.2		Hydro	2012
FINDIK I HES (ADV ELEKTRİK ÜRETİM LTD. ŞTİ.)	11.25	27	Hydro	2012
GEMCİLER REG. VE HES (BOZTEPE ENERJİ ÜRET.)	7.98	20	Hydro	2012
GÖKGEDİK HES (UHUD ENERJİ ÜRETİM TİC.)	20.49	75	Hydro	2012
GÖKGEDİK HES (UHUD ENERJİ ÜRETİM TİC.)	3.776		Hydro	2012
GÜDÜL 2 HES (YAŞAM ENERJİ ELEKTRİK ÜRETİM)	4.88	15	Hydro	2012
HORU REG. VE HES (MARAŞ ENERJİ	4.24	25	Hydro	2012

YATIRIM SN.)				
HORU REG. VE HES (MARAŞ ENERJİ YATIRIM SN.)	4.24		Hydro	2012
HORYAN HES (HORYAN ENERJİ A.Ş.)	5.68	15	Hydro	2012
İKİZDERE (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	18.6	100	Hydro	2012
KARTALKAYA HES (SIR ENERJİ ÜRETİM SAN.)	8.001	15	Hydro	2012
KAYAKÖPRÜ 2 HES (ARSAN ENERJİ A.Ş.)	10.2		Hydro	2012
KILAVUZLU HES (ELEKTRİK ÜRETİM A.Ş.)	40.5	100	Hydro	2012
KIRIKDAĞ HES (ÖZENİR ENERJİ ELEKTRİK ÜRET.)	16.86	40	Hydro	2012
KOZDERE HES (ADO MADENCİLİK ELEKTRİK ÜR.)	6.12	8	Hydro	2012
KÖKNAR HES (AYCAN ENERJİ ÜRETİM TİC.)	8.024	15	Hydro	2012
KUZGUN (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	20.9		Hydro	2012
KÜRCE REG. VE HES (DEDEGÖL ENERJİ)	12.046	36	Hydro	2012
MERCAN (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	20.4	48	Hydro	2012
MİDİLLİ REG. VE HES (MASAT ENERJİ ELEKTRİK)	20.97	45	Hydro	2012
MURAT I-II REG. VE HES (MURAT HES ENERJİ EL.)	35.628	107	Hydro	2012
MURATLI REG. VE HES (ARMAHES ELEKTRİK ÜR.)	11	55	Hydro	2012
MURSAL I HES (PETA MÜHENDİSLİK ENERJİ)	4.18	13	Hydro	2012
ÖREN REG. VE HES (ÇELİKLER ELEKTRİK ÜRETİM)	19.932	16	Hydro	2012
PAPART HES (ELİTE ELEKTRİK ÜRETİM)	22	80	Hydro	2012
PAPART HES (ELİTE ELEKTRİK ÜRETİM)	4.6		Hydro	2012
POLAT HES (ELESTAŞ ELEKTRİK ÜRETİM A.Ş.)	3.28	20	Hydro	2012
SANCAR REG. VE HES (MELİTA ELEKTRİK ÜRETİM)	0.74	2	Hydro	2012
SARIHIDIR HES (MOLU ENERJİ ÜRETİM A.Ş.)	6	18	Hydro	2012
SEYRANTEPE HES (SEYRANTEPE ELEKT. ÜRET.)	56.84	161	Hydro	2012
ŞİFRİN REG. VE HES (BOMONTİ ELK. MÜH. MÜŞ.)	6.744	10	Hydro	2012
TELEME REG. VE HES (TAYEN ELEKTRİK ÜRET.)	1.57	6	Hydro	2012
TELLİ I-II HES (FALANJ ENERJİ ELEKTRİK ÜRET.)	8.72	18	Hydro	2012
TERCAN (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	15	28	Hydro	2012
TUĞRA REG. VE HES (VİRA ELEKTRİK ÜRETİM A.Ş.)	4.9	10	Hydro	2012
ÜÇKAYA HES (ŞİRİKÇİOĞLU ELEKTRİK ÜRETİM A.Ş.)	1.04	3	Hydro	2012

YILDIRIM HES (BAYBURT ENERJİ ÜRETİM VE TİC.)	7.118	22	Hydro	2012
YILDIRIM HES (BAYBURT ENERJİ ÜRETİM VE TİC.)	3.559		Hydro	2012
YOKUŞLU KALKANDERE HES (SANKO ENERJİ)	5.2		Hydro	2012
ZEYTİN BENDİ HES (ZEYTİN ENERJİ ÜRET. SAN.)	5.2	10	Hydro	2012
KÜÇÜKER TEKSTİL SAN. VE TİC. A.Ş.	5	40	Lignite	2012
ACARSOY TERMİK KOM.ÇEV.SANT. (ACARSOY EN.)	50	375	Natural Gas	2012
AFYON DGKÇ (DEDELİ DOĞALGAZ ELEKTRİK ÜR.)	126.1	945	Natural Gas	2012
AGE DOĞALGAZ KOM. ÇEV. SANT. (AGE DENİZLİ)	94	1,057	Natural Gas	2012
AGE DOĞALGAZ KOM. ÇEV. SANT. (AGE DENİZLİ)	47		Natural Gas	2012
AKDENİZ KİMYA SAN. VE TİC. A.Ş.	2.022	30	Natural Gas	2012
AKSA AKRİLİK KİMYA SAN. A.Ş. (İTHAL KÖM.+D.G)	75	700	Natural Gas	2012
ALES DOĞALGAZ KOM. ÇEV. SANT. (ALES ELEKT.)	49	370	Natural Gas	2012
ALTINYILDIZ MENSUCAT VE KONF. FAB. (Tekirdağ)	5.5	38	Natural Gas	2012
ASAŞ ALÜMİNYUM SANAYİ VE TİCARET A.Ş.	8.6	65	Natural Gas	2012
BAMEN KOJENERASYON (BAŞYAZICIOĞLU TEKSTİL)	2.145	14	Natural Gas	2012
BİLECİK DOĞALGAZ ÇS. (TEKNO DOĞALGAZ ÇEV.)	25.8	190	Natural Gas	2012
BİLECİK DOĞALGAZ KÇS. (DEDELİ DOĞALGAZ EL.)	19.4	945	Natural Gas	2012
BİLECİK DOĞALGAZ KÇS. (DEDELİ DOĞALGAZ EL.)	107.03		Natural Gas	2012
BİLKUR TEKSTİL BOYA TİC. A.Ş.	2	14	Natural Gas	2012
BİNATOM ELEKTRİK ÜRETİM A.Ş. (Emet/KÜTAHYA)	2.145	13	Natural Gas	2012
BİNATOM ELEKTRİK ÜRETİM A.Ş. (Emet/KÜTAHYA)	2.145	78	Natural Gas	2012
BİNATOM ELEKTRİK ÜRETİM A.Ş. (Emet/KÜTAHYA)	4.044		Natural Gas	2012
BİNATOM ELEKTRİK ÜRETİM A.Ş. (Emet/KÜTAHYA)	2.022		Natural Gas	2012
BİS ENERJİ(Sanayi/ Bursa)	48	3450	Natural Gas	2012
BOSEN ENERJİ ELEKTRİK ÜRETİM AŞ.(Bursa)	27.96	1980	Natural Gas	2012
DURMAZLAR MAKİNA SANAYİ VE TİCARET A.Ş.	1.286	10	Natural Gas	2012
DURUM GIDA TERMİK KOJEN. SANT. (DURUM GIDA)	3.6	29	Natural Gas	2012
EGE SERAMİK ENERJİ SANTRALI	13.08	90	Natural Gas	2012
ENERJİ-SA (ÇANAKKALE)	0.915	520	Natural Gas	2012
ENERJİ-SA (KÖSEKÖY)	120	930	Natural Gas	2012

ENERJİ-SA (MERSİN)	1.465	520	Natural Gas	2012
ENERJİ-SA (Zeytinli/ADANA)	0.83	917	Natural Gas	2012
ERDEMİR(F.O+K.G+Y.F.G+DG)(Ereğli-Zonguldak)	53.9	710	Natural Gas	2012
ERZURUM MEYDAN AVM (REDEVKO BİR EMLAK)	2.436	16	Natural Gas	2012
GOODYEAR (İzmit/Köseköy)	5.2	39	Natural Gas	2012
GÜRTEKS İPLİK SANAYİ VE TİCARET A.Ş.	6.698	53	Natural Gas	2012
HATİPOĞLU PLASTİK YAPI ELEMANLARI SAN.	2	14	Natural Gas	2012
İŞBİRLİĞİ ENERJİ ÜRETİM SAN. VE TİC. A.Ş.	19.46	146	Natural Gas	2012
İZMİR BÜYÜK EFES OTELİ KOJENERASYON TES.	1.2	9	Natural Gas	2012
JTI TORBALI KOJENERASYON SANTR. (JTI TÜTÜN)	4	30	Natural Gas	2012
KIVANÇ TEKSTİL SAN.ve TİC.A.Ş.	2.145	33	Natural Gas	2012
MOSB Enerji Elektrik Üretim Ltd. Şti. (DG.+M+F.O.)(Manisa)	12	1050	Natural Gas	2012
MUTLU MAKARNACILIK SANAYİ VE TİCARET A.Ş.)	2	16	Natural Gas	2012
NAKSAN ENERJİ ELEKTRİK ÜRETİM A.Ş.	8	60	Natural Gas	2012
ODAŞ DOĞALGAZ KÇS (ODAŞ ELEKTRİK ÜRETİM)	54.96	966	Natural Gas	2012
ODAŞ DOĞALGAZ KÇS (ODAŞ ELEKTRİK ÜRETİM)	18.32		Natural Gas	2012
OFİM ENERJİ SANTRALI (OSTİM FİNANS VE İŞ MER.)	2.05	16	Natural Gas	2012
ÖZMAYA SANAYİ A.Ş.	5.354	40	Natural Gas	2012
PANCAR ELEKTRİK ÜRETİM A.Ş.	17.46	260	Natural Gas	2012
PİSA TEKSTİL VE BOYA FABRİKALARI (İstanbul)	1.02	7	Natural Gas	2012
SELÇUK İPLİK SAN. VE TİC. A.Ş.	8.6	65	Natural Gas	2012
SELVA GIDA SAN. A.Ş.	1.712	14	Natural Gas	2012
SODA SANAYİ A.Ş. (Mersin)	252.2	1765	Natural Gas	2012
ŞANLIURFA OSB (RASA ENERJİ ÜRETİM A.Ş.)	11.72	900	Natural Gas	2012
TEKİRDAĞ-ÇORLU KOJ. SAN. (ODE YALITIM SAN.)	2.035	15	Natural Gas	2012
YENİ UŞAK ENERJİ ELEKTRİK SANTRALI	8.73	135	Natural Gas	2012
YENİ UŞAK ENERJİ ELEKTRİK SANTRALI	1		Natural Gas	2012
YONGAPAN (KASTAMONU ENTEGRE)(D.İskelesi)	15.04	185	Natural Gas	2012
ZORLU ENERJİ (B.Karıştıran)	25.7	1112	Natural Gas	2012
AKIM ENERJİ BAŞPINAR (SÜPER FİLM)	25.32	177	Natural Gas	2011
AKSA AKRİLİK (İTHAL KÖM.+D.G)	25	175	Natural Gas	2011
ALDAŞ ALTYAPI YÖNETİM DANIŞMANLIK	1.95	15	Natural Gas	2011
BOYTEKS TEKSTİL SAN. VE TİC. A.Ş.	8.6	67	Natural Gas	2011
CENGİZ ÇİFT YAKITLI K.Ç.E.S.	131.335	985	Natural Gas	2011
FRAPORT IC İÇTAŞ ANTALYA HAVALİMANI	8	64	Natural Gas	2011
GORDİON AVM (REDEVCO ÜÇ EMLAK)	2.014	15	Natural Gas	2011

GOREN-1 (GAZİANTEP ORGANİZE SAN.)	48.65	277	Natural Gas	2011
NUH ENERJİ EL. ÜRT.A.Ş. (ENERJİ SANT.-2)	119.98	900	Natural Gas	2011
AREL ENERJİ BİYOKÜTLE TESİSİ (AREL ÇEVRE)	1.2	18	Waste	2012
AREL ENERJİ BİYOKÜTLE TESİSİ (AREL ÇEVRE)	1.2		Waste	2012
BOZYAKA RES (KARDEMİR HADDECİLİK VE ELEKT.)	12	32	Wind	2012
DİNAR RES (OLGU ENERJİ YATIRIM ÜRETİM)	16.1	51	Wind	2012
KARADAĞ RES (GARET ENERJİ ÜRETİM)	10	29	Wind	2012
ŞENKÖY RES (EOLOS RÜZGAR ENERJİSİ ÜRETİM)	26	74	Wind	2012

Appendix 5. Further background information on monitoring plan

Not available.

Appendix 6. Summary of post registration changes

Not available.