



**PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Sadilli Wind Farm Project, Turkey
Version number of the PDD	1.5
Completion date of the PDD	11.09.2013
Project participant(s)	Çanres Elektrik Üretim A.Ş.
Host Party(ies)	Turkey
Sectoral scope and selected methodology(ies)	Energy Industries - Renewable Sources ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources v.13.0.0.
Estimated amount of annual average GHG emission reductions	67,074 tCO _{2e}

Prepared by:



SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The Project, owned by Çanres Elektrik Üretim A.Ş. (hereafter referred to as the “Project owner”), is a large scale wind farm project located in Çanakkale and Tekirdağ provinces, Turkey.

The Project owner is a private entity owned by the mother company of Fina Enerji Holding. The purpose of the Project is to generate electrical power in an efficient, clean, reliable and sustainable way with utmost respect on social and environmental aspects and to reduce emissions by partially substituting the electricity supply of fossil fuel fired power plants in Turkey.

The Project consists of the installation of 14 wind turbines which will have an installed capacity of 2.75 MW each, totalling 38.5 MW_m. The generation license has a limit of 33 MW_e, meaning that the total electrical power supply of the Project is limited to 33 MW_e. The Project is expected to generate 112,000 MWh per year. The turbines, each equipped with 3 blades, will have a hub height of 85 m and a rotor diameter of 100 m. The Project will be connected to the Keşan transformer station via a 154 kV high voltage transmission line.

Prior to the implementation of the proposed Project, local electricity demand is satisfied by the Turkish grid that is dominated by thermal power. The baseline scenario of the Project activity is the same as the scenario existing prior to the start of implementation of the Project activity.

The mobilisation for construction of the Project has started on 03.09.2012 and the generation is expected to start on 01.05.2013 partially with 7 turbines. Remaining 7 turbines are planned to start operating in August 2013. The Project has estimated emission reductions of 67,074 tCO_{2e} annually.

A.2. Location of project activity

A.2.1. Host Party(ies)

Republic of Turkey

A.2.2. Region/State/Province etc.

Çanakkale and Tekirdağ Provinces, Gelibolu.

A.2.3. City/Town/Community etc.

The Project has a distance of approximately 18km to the town of Malkara and 22 km to the town of Keşan.

The following villages lie in the vicinity of the Project: Şadıllı, Süleymaniye, Bayramiç, Elmalı. None of these villages is closer than 1.5-2 km to the nearest turbine. Other than Elmalı village, the other villages lie behind mountains and have transportation distances more than 30 km to the project site by road.

A.2.4. Physical/Geographical location

The map of the Project location and the GPS coordinates of the turbines are provided below;

Table 1. Turbine coordinates¹

Turbine Number	E (UTM)	N (UTM)	E (Degrees)	N (Degrees)
1	490466	4510521	40° 44' 44"	26° 53' 13"
2	490775	4510830	40° 44' 54"	26° 53' 27"
3	491255	4511004	40° 44' 59"	26° 53' 47"
4	491476	4511166	40° 45' 5"	26° 53' 56"
5	491886	4511331	40° 45' 10"	26° 54' 14"
6	492186	4511579	40° 45' 18"	26° 54' 27"
7	492440	4511346	40° 45' 11"	26° 54' 38"
8	492745	4511282	40° 45' 9"	26° 54' 51"
9	493078	4511459	40° 45' 15 "	26° 55' 5"
10	493436	4511588	40° 45' 19 "	26° 55' 20"
11	493555	4511809	40° 45' 26"	26° 55' 25"
12	493586	4511401	40° 45' 13"	26° 55' 26"
13	493819	4511231	40° 45' 7"	26° 55' 36"
14	494051	4511035	40° 45' 1"	26° 55' 46"



Figure 1. Project location

¹ Source: Generation license amendment

A.3. Technologies and/or measures

As the Project activity is a greenfield project, there is no equipment installed prior to the Project activity.

Baseline scenario description

- The scenario existing prior to the start of the implementation of the Project activity is the Turkish electricity grid providing the same electricity service as the Project.
- The Project scenario is the implementation of the Project, i.e. the installation and operation of wind turbines which will supply electrical power to the national power grid and replace the same amount of electricity generated mostly by fossil fuel fired power plants that are connected to the grid.
- The baseline scenario is the same as the scenario existing prior to the start of implementation of the Project activity. The details of the baseline scenario analysis are clearly presented in section B.5.

Technology to be employed

The Project activity involves the generation of renewable energy from wind, thereby displacing grid electricity that is partly generated from fossil fuel fired power plants. The wind-driven blades are connected to an electricity generator, which produces electrical energy and supplies it to the grid without storage.

GE Energy, a wind turbine manufacturer, has been selected as equipment provider. The Project includes 14 turbines:

Table 2. Equipment information

Turbine number	Model of turbines	Explanation
14 x 2.75 MW _e	GE 2.75-100 wind turbine	The turbines will be of similar model and the total capacity of the wind farm will be 38.5 MW _m . The total overall power supply will be limited to 33 MW _e in order to comply with the generation license.

The generation license has been received from EMRA on 15.02.2012 which will be valid for 49 years. The final amended license for 33MW_e has not been issued as of the date of PDD preparation.

The turbines consist of the following components: rotor, drive train, gearbox, generator, cooling and filtration, braking system, nacelle, yaw system, tower, control and grid connection and lightning protection. The model of the turbines and their specifications are provided below:

Table 3. Specifications of turbine units²

Component	Explanation / Specification
Model	GE 2.75-100
Rated power	2.75 MW _e
Rotor diameter	100 m
Tower	85 m

² Source: http://www.ge-energy.com/content/multimedia/ files/downloads/GEA18379A_2.75-100%20Wind%20Turbine_r1.pdf

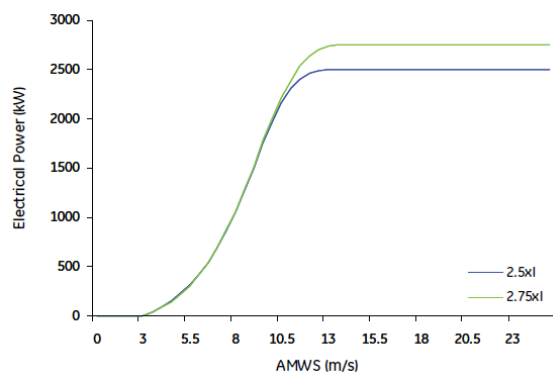


Figure 2. Power curve of the GE 2.75 – 100 turbine

The wind turbines will be connected to a medium voltage collection system at project site which will be installed parallel to the site access roads to link each turbine. This system will be connected to the substation at project site and from there to the national interconnected electric power grid system. Each turbine will be equipped with a control unit so that various parameters of each turbine can be observed real time at the substation, and these data can also be obtained via internet from a distance.

A.4. Parties and project participants

Party involved (host) indicates a 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 (host)	Çanres Elektrik Üretim A.Ş. (Private entity established in Turkey)	No

A.5. Public funding of project activity

There is no public funding from any Annex-I party for this Project.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

The following CDM tools and methodologies are used;

- ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources v.13.0.0.
- “Tool to calculate the emission factor for an electricity system”, v.02.2.1.
- The CDM methodological additionality tool, “Tool for the demonstration and assessment of additionality”, v.06.1.0.

B.2. Applicability of methodology

Methodology ACM0002 is applicable to the proposed Project, because the project activity meets all of the applicability criteria specified in the methodology:

- The proposed project is the installation of a new grid-connected renewable wind power plant;
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;
- The proposed project does not involve any onsite switching from fossil fuels to renewable energy source;
- The proposed Project does not involve biomass fired power generation.

The “Tool to calculate the emission factor for an electricity system” (v.02.2.1) can be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid. For the proposed Project activity, the electricity generated will be fed into the national grid of Turkey. Therefore, the Project meets the applicability criteria of the “Tool to calculate the emission factor for an electricity system” (version 02.2.1).

According to “Tool for the demonstration and assessment of additionality” (v.06.1.0), when the additionally tool is included in an approved methodology, its application is mandatory by project participants.

Therefore, the Project activity is in full compliance with the applicability conditions of ACM0002.

B.3. Project boundary

Table 4. Sources and greenhouse gases included in the project boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO ₂ emissions from electricity generated by fossil fuel-fired power plants that are substituted due to Project activity.	CO ₂	Yes	Main emission source. The dominant emissions from power plants are in the form of CO ₂ , therefore CO ₂ emissions from fossil fuel fired power plants connected to the grid will be accounted for in baseline calculations.
		CH ₄	No	Minor emission source.
		N ₂ O	No	Minor emission source.
		Other		

Project scenario	CO ₂ emissions from fossil fuel consumption on Project's site.	CO ₂	No	This emission source is neglected, in line with ACM0002.
		CH ₄	No	
		N ₂ O	No	
		Other		

The spatial extent of the project boundary includes the Project power plant and all power plants connected physically to the electricity system that the Project power plant is connected to.

The Project is a renewable energy project, aiming at reducing GHG emissions resulting from energy generation activities. Therefore, the Project does not involve any GHG sinks or reservoirs.

For the identification of the baseline scenario, only electricity generation is considered, as the Project has the sole purpose of generating energy. The sources of baseline GHG emissions are defined as the thermal power plants in Turkey, which consume a variety of fuels such as naphtha, coal, lignite or natural gas.

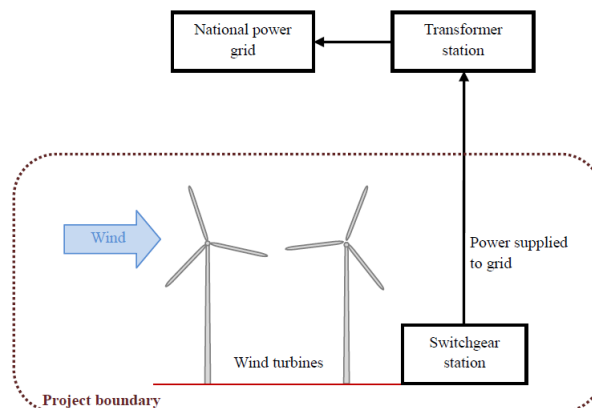


Figure 3. Project boundary

B.4. Establishment and description of baseline scenario

The Project activity uses the approach described in the ACM0002 v.13.0.0 which describes three alternatives for the baseline. The Project activity is the installation of a new wind power plant and does not involve the retrofit or replacement of an existing grid-connected renewable power plant or any capacity addition. In the absence of the Project activity, the baseline scenario is the continuation of the current situation, where the thermal power plant dominated power generation in Turkey is continued with usual maintenance and addition of new power plants to the grid with historical trends.

Accordingly, if the proposed project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

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”.

The emission factor can be calculated in a transparent and conservative manner as;

- A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system”,

Or,

- The weighted average emissions (in tCO₂/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The Project adopts method (a) to calculate the emission factor. The basic parameters used for calculating baseline emissions of the Project are listed below;

Table 5. Parameters used for calculating baseline emissions

Parameter	Value	Explanation / Data Source
Operation Margin (OM) emission factor	0.654	Turkey national GHG Inventory



(EF _{Grid,OM,y} as tCO _{2e} /MWh)		TEIAS power generation reports
Build Margin (BM) emission factor (EF _{Grid,BM,y} as tCO _{2e} /MWh)	0.434	TEIAS capacity projection reports IPCC fuel emission values
Combined Margin (CM) emission factor (EF _{Grid,CM,y} as tCO _{2e} /MWh)	0.599	Calculation
Net annual electricity supplied to the grid (MWh)	112,000	Feasibility Study

B.5. Demonstration of additionality

The following steps are used to demonstrate the additionality of the Project activity according to the “Tool for the demonstration and assessment of additionality”, v.6.1.0.

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

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

ACM0002 v.13.0.0 requires that the following baseline scenarios should be considered as options:

P1: “The proposed project activity undertaken without being registered as a CDM project activity”:

This scenario is the installation of the Project activity and its connection to the Turkish national grid without considering carbon revenues.

P2: “Other realistic and credible alternative scenario(s) to the proposed CDM project activity scenario that deliver outputs services (e.g., cement) or services (e.g. electricity, heat) with comparable quality, properties and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology”:

The Project owner does not plan any project other than the proposed Project activity on site which would generate electricity and supply it to the grid. Therefore this scenario is not a plausible alternative to the Project owner.

P3: “If applicable, continuation of the current situation (no project activity or other alternatives undertaken)”:

This scenario is the continuation of the current situation, where the thermal power plant dominated power generation in Turkey is continued with usual maintenance and addition of new power plants to the grid with historical trends.

Outcome of sub-step 1a: Identified realistic and credible alternative scenario(s) to the project activity.

Sub step 1b: Consistency with mandatory laws and regulations

The following laws and regulations apply to the Project activity and its alternatives³;

³ Source: <http://www2.epdk.gov.tr/english/regulations/electricity.htm>

Table 6. Laws and regulations applicable for electricity generation activities

Legal Framework Concerning Electricity Generation	
Electricity Market Balancing and Settlement Regulation	
Regulation Concerning Electricity Demand Forecast	
Communiqué Regarding Connection to and Use of Transmission and Distribution Systems in the Electricity Market	
Communiqué Regarding Preparation of Retail Contract in The Electricity Market	
Communiqué Concerning Principles and Procedures for Selection in the Existence of More Than One Application for Generation of Electricity from the Same Source and on the Same Region	
Communiqué Regarding Regulation of Market Management Revenue	
Regulation on Principles and Procedures for Granting Guarantee of Origin	
Electricity Transmission System Supply Reliability and Quality Regulation	
Electricity Market Grid Regulation	
Communiqué Regarding The Principles and Procedures of Financial Settlement In The Electricity Market	
Electricity Market Import and Export Regulation	
Communiqué Regarding Regulatory Accounting Guidelines	
Electricity Market Distribution Regulation	
Communiqué Regarding the Meters to be used in the Electricity Market	
Communiqué Regarding Wind and Solar Measurements	
Electricity Market Customer Services Regulation	
Electricity Market Eligible Consumer Regulation	
Electricity Market License Fees	
Electricity Market Tariffs Regulation	
Electricity Market Licensing Regulation	
Electricity Market Law	
Other relevant laws:	
Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy (Nr. 5346)	
Revision to Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy (Nr. 6094, 29.12.2010)	
Energy Efficiency Law (Nr. 5627)	
Forest Law (Nr. 6831)	

Table 7. Laws and regulations applicable in the host country concerning environmental integrity

Legal Framework Concerning the Environment	
The Environment Law	Packaging Waste Control Regulation
Air Quality Control Regulation	Soil Protection Law
Noise Control Regulation	Air Pollution from Heating Regulation
Water Pollution Control Regulation	Hazardous Chemicals Regulation
Control of Solid Waste Regulation	Waste Batteries Regulation
Environmental Impact Assessment Regulation	Soil Pollution Control Regulation
Medical Waste Regulation	Air Pollution from Vehicles Regulation
Toxic Chemical Substance and Prod Regulation	Medical Waste Control Regulation
Hazardous Waste Regulation	Water Resources Protection from Hazardous Materials Regulation
Waste Oils Control Regulation	Urban Waste Water Treatment Regulation
Industrial Air Pollution Control Regulation	Drinking Water Quality Regulation

Outcome of sub-step 1b: Identified realistic and credible alternative scenario(s) to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

Step 2. Investment analysis

The Project activity will export the electricity to the Turkish grid and will reduce a proportional amount of GHG emissions that would otherwise have been generated by fossil fuel power plants in the grid, resulting in the reduction of carbon intensity in the grid. The electricity delivered to the grid and the grid emission factor becomes the basis in the calculation of emissions reductions. Estimated annual emission reductions resulting from the Project activity is approximately 67,074 tCO_{2e}/a.

This step involves the determination whether the proposed Project activity is not:

- a) The most economically or financially attractive; or
- b) Economically or financially feasible, without the revenue from the sale of emission reductions.

Sub-step 2a: Determine appropriate analysis method

The following options are available to conduct the benchmark analysis;

Table 8. Selection of investment analysis option

	Investment Analysis Options	Explanation
Option (I)	Simple cost analysis	Not applicable to the project because the project activity generates the revenue from the sales of electricity generation.
Option (II)	Investment comparison analysis	Not applicable because an investment comparison analysis shall be used if the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services.
Option (III)	Benchmark analysis	This option (III) is chosen.

ACM0002 provides three options for the investment analysis. The benchmark analysis option is selected because more than one alternative is remaining after Step 2.

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

The likelihood of the development of this Project will be determined by analyzing its “Real Project IRR” based on the scenarios with and without the sale of carbon credits. The chosen benchmark for the Project is the (pre-tax) WACC, as the CDM “Guidelines on the Assessment of Investment Analysis”, v.5 (referred to as “Guidelines” hereafter) suggests.

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

The following financial figures are used for calculations;

Table 9. Parameters used for benchmark analysis

Parameter	Figure	Source / Justification
Discount rate (WACC)	8.4%	Calculated as WACC
Electricity Price/kWh	5.4 EUR cents/kWh	Guaranteed electricity sales price in Turkey (7.3 USD cents/kWh converted to EUR)
Capital Expenditure	44,413 TEUR	Benchmark with another wind farm of PP
O&M Costs	1,574 TEUR/a	Benchmark with another wind farm of PP
Royalty Payment	1,463 TEUR/a	Contract with TEIAS
Investment horizon	25 years	The Guidelines suggest a minimum of 10 years and a maximum of 20 years. Operational lifetime of the Project is 25 years ⁴ .
Corporate tax (CT) rate	20%	This is the official corporate tax rate in the host country (www.invest.gov.tr)
Equity (E) / Debt (D) ratio	20/80	Min. Equity required by EMRA
Power Generation	112,000 MWh/a	Feasibility Study

The discount rate (WACC) which is selected as the benchmark value is calculated with the following formulas:

$$WACC = (E / (E + D)) * \text{Cost of Equity} + D / (E + D) * \text{Cost of Debt} * (1 - CT) \quad [1]$$

$$WACC_{\text{pretax}} = WACC / (1 - CT) \quad [2]$$

Financial expenditures are not considered in the calculations. The Project IRR calculations are carried out for both scenarios with and without considering carbon credits. The calculations conservatively assume that the revenues from electricity sales are obtained without delay, that there are no major unforeseen malfunctions and that wind properties will be as expected. The results are provided below;

Table 10. Comparative table of the financial indicators with and without carbon revenues

Scenario	Real Project IRR
With carbon credits	5.0%
Without carbon credits	4.2%
Benchmark discount rate	8.4%

The Project IRR remains below the benchmark rate, even when the corporate tax rate is taken as 0%. The results indicate that without carbon credits, the financial performance of the Project is not feasible. Under these circumstances, the Project would not be attractive for the investor.

Sub-step 2d: Sensitivity analysis

The purpose of the sensitivity analysis is to examine how the uncertainty of a single variable such as total investment cost and net power output will have an impact on the Project IRR. According to “Guidelines on the Assessment of Investment Analysis”, paragraph 20, only variables that constitute more than 20% of

⁴ Reference: UNFCCC “Tool to determine the remaining lifetime of equipment”, v.1.

either total project costs or total project revenues should be subjected to sensitivity analysis. Only electricity prices, capital investment and O&M costs are the parameters that influence cash flow by more than 20%. The assumptions set in the analysis process are increasing/decreasing $\pm 15\%$ from the original level of the parameters. The following parameters are identified which would have a significant impact on the financial results;

- Electricity prices,
- Capital expenditure,
- Operation and maintenance costs.

The results are shown in the figure below;

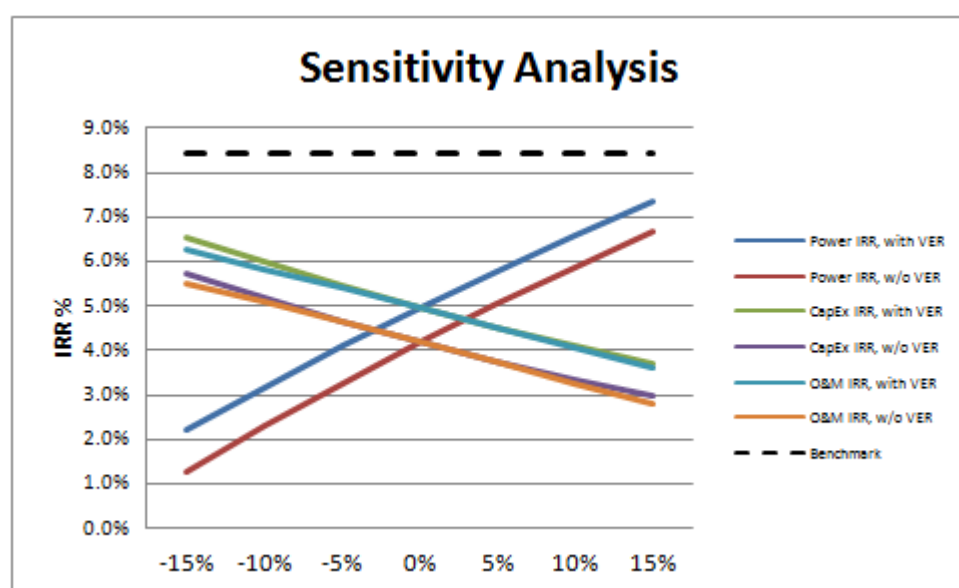


Figure 4. Results of the sensitivity analysis

Here it can be seen that all parameters selected for the sensitivity analysis, i.e. power sales, CapEx and operational expenses have all considerable impact on the Project IRR. The results indicate the following:

- Even if the electricity price or power generation would increase by 15%, the Project would stay unfeasible. The electricity price at which the Project IRR is equal to the benchmark is 6.88 EUR cents/kWh, which represents a 26.7% increase relative to the baseline electricity price. This is significantly higher than the market price and the guaranteed tariff for renewable energy in the host country.
- Even if the capital expenditures would decrease by 15%, the Project would stay unfeasible. The breakeven point for CapEx is approximately 29,290 TEUR, which represents a 34.1% decrease relative to the baseline CapEx. It is considerably lower than the expected investment cost. Such a change is not realistic.
- Even if the operational and maintenance costs, or the annual royalty payments to TEIAS would decrease by 15%, the Project would stay unfeasible. The breakeven point for O&M costs is negative, which is not realistic.

Within the reasonable variation of the CapEx, price of electricity and O&M costs, the calculated IRRs are below the benchmark IRR, thus the Project remains economically unfeasible without carbon revenues. This demonstrates that the proposed Project activity is not the most economically or financially attractive

and not financially feasible without the revenue from the sale of carbon credits.

Outcome of Step 2: The proposed Project activity is unlikely to be the most financially/economically attractive.

Step 3. Barrier analysis

This step is not applied.

Step 4. Common practice analysis

This step involves providing an analysis of any other activities that are operational and that are similar to the proposed project activity. According to the guidance provided in the “Tool for the demonstration and assessment of additionality”, v.6.1.0, the Project activity falls within the “measures that are listed in paragraph 6” which corresponds to the following steps:

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

Only the projects that have a capacity between +/-50% of 33 MWe, i.e. between 16.5 MW and 49.5MW are considered.

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;

Public power plants and carbon projects are left out. The number of remaining power plants, N_{all} , is 56.

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff} ;

Wind power plants are left out. The number of power plants that are not wind farms (N_{diff}) is 56.

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.

$$F = 1 - 56/56 = 0$$

$$N_{all}-N_{diff} = 56 - 56 = 0$$

The proposed project activity is a common practice within a sector in the applicable geographical area if both the following conditions are fulfilled:

- a) The factor F is greater than 0.2, and
- b) $N_{all}-N_{diff}$ is greater than 3.

The factor F for the Project activity is *not* greater than 0.2 and the difference of $N_{all}-N_{diff}$ is *not* greater than 3. Therefore the Project is not common practice.

Prior Consideration of Carbon Finance

The starting date of the Project activity is 28.02.2012. Please refer to Section C for details. This is the fourth wind farm of the same Project owner, and the first three projects are registered with the Gold Standard. Therefore the Project owner was well aware of carbon finance before the starting date of the Project activity, demonstrating prior consideration of carbon credits. The bank statement regarding the inclusion of carbon income, which is before the starting date of the Project activity, further demonstrates prior consideration of carbon credits. Moreover, an internal meeting memo dating prior to Project starting date clearly demonstrates that carbon finance has been one of the key drivers in the decision of going forward with the project. The chronological history of the Project is provided below;

Table 11. Timeline of the Project

Date	Action
01.11.2007	EMRA is applied for the license
15.02.2012	License is issued by EMRA
15.11.2011	Proposals for carbon development are collected (prior consideration)
29.12.2011	Confirmation for going ahead with carbon development services
26.01.2012	EIA exemption permit acquired.
28.02.2012	Turbine order is signed.
06.08.2012	Agreement with the construction company is signed.
03.09.2012	Mobilisation on site is initiated (road construction etc.).
19.12.2012	Loan agreement is signed.
26.12.2012	Final license amendment application is made to EMRA.
01.05.2013	Estimated operational start date (partial).

Outcome of Step 4: The Project is a pure voluntary project that is established for the sole purpose of generating electricity. Its realization and operation are not mandated by any enforced law, statute or other regulatory framework. The financially more viable alternative to the Project activity is that the electricity generated by the Project activity would have otherwise been provided by the national grid, and the emission reductions of the Project would not have been realised in the absence of carbon credits. All sub-steps of Step 4 are satisfied and the proposed Project activity is additional.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

Emissions reductions achieved by the Project activity are considered equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity. The baseline emissions (BE_y) include only CO₂ emissions that are displaced due to the Project activity and the approach adopted for calculating emission reductions due to implementation of Project activity is according to the “*Tool to calculate the emission factor for an electricity system*”, which is applied in the context of the Project with the following steps;

Step 1. Identify the relevant electricity systems

For determining electricity emission factors, the project electricity system is defined by the spatial extent of power plants that are physically connected through transmission and distribution lines to the project

activity and that can be dispatched without significant transmission constraints.

The Project will be connected to the Turkish electricity grid, which is an interconnected grid to which all power plants are connected to. Therefore, the Project electricity system is identified as the national grid. There are no regional grids in the host country. Turkey imports electrical power from and exports to neighbour countries, which are defined as connected electricity systems for the Project. According to the baseline methodology, imports are regarded as a power source delivering electricity to the grid with an OM emission factor of 0 tCO₂/MWh, since some small amount of electricity being imported is purchased from connected electricity systems located in other countries.

Step 2. Choose whether to include off-grid power plants in the project electricity system

The “Tool to calculate the emission factor for an electricity system” offers two options to calculate the operating margin and build margin emission factor:

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

Option I is applied and off-grid power plants are excluded from the calculations.

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

The baseline methodology allows a choice among four methods for the calculation of OM emission factor;

- a) Simple OM, or
- b) Simple adjusted OM, or
- c) Dispatch Data Analysis OM, or
- d) Average OM

There exist no publicly available data for the dispatch data analysis (c) or for the simple adjusted OM (b). There exists no nuclear power plant in Turkey, and there is no indication that coal or lignite is obviously used as must-run. Hydro, geothermal, wind power plants and other renewables are included as low-cost/must-run resources (hereafter referred as “lc-mr”), which turns out to be 21% of the total electricity generation on average in the last 5 years, as shown in **Table 12**. The share of lc-mr resources is less than 50% and available data are limited, therefore simple OM (a) has been selected. The electricity generation breakdown based on fuel sources and their shares are provided below;

Table 12. Gross and Net Electricity Generation [GWh] in Turkey⁵

Fuel Type	2006	2007	2008	2009	2010	Avg. Share
Coal	14,217	15,136	15,858	16,596	19,104	8%
Lignite	32,433	38,295	41,858	39,090	35,942	19%
Fuel Oil	4,232	6,470	7,209	4,440	2,144	3%
Diesel Oil	58	13	266	346	4	0%
LPG	0	0	0	0	0	0%
Naphtha	50	44	44	18	32	0%
Natural Gas	80,691	95,025	98,685	96,095	98,144	48%

⁵ Source: TEIAS

([http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim\(22-45\)/35\(75-10\).xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/35(75-10).xls),
[http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim\(22-45\)/33\(84-10\).xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/33(84-10).xls))

Renewables	154	214	220	340	458	0%
Hydro	44,244	35,851	33,270	35,958	51,796	21%
Geothermal & Wind	221	511	1,009	1,931	3,585	1%
Gross Gen. Total [GWh]	176,300	191,558	198,418	194,813	211,208	100%
Net Generation	169,543	183,340	189,762	186,619	203,046	
Net Delivery Ratio	96%	96%	96%	96%	96%	
Imports	573	864	789	812	1,144	
Gross Total excl. LC-MR	131,681	154,983	163,919	156,583	155,370	
Net Total excl. LC-MR	127,208	149,198	157,558	150,810	150,510	

Accordingly, the emission factor can be calculated using either of the two data vintages:

- Ex-ante option, where a 3-year generation-weighted average based on the most recent data is used. Monitoring and recalculation of the emission factor is not required, or,
- Ex-post option, where the data of the year is used, in which the project activity displaces grid electricity. Yearly update of the emission factor is required.

The ex-ante option (a) is selected to carry out the baseline methodology for the Project. This means that the OM will be calculated as a weighted average of the latest 3 years and will be used as a constant throughout the crediting period.

Step 4. Calculate OM emission factor according to the selected method

The “Tool to calculate the emission factor for an electricity system” offers two options to calculate $EF_{grid,OMsimple,y}$:

- Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit, or,
- Option B: Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Detailed data on the individual power plants connected to the national electricity grid necessary for applying option A is not available. Therefore Option A cannot be used. Since only renewable power generation are considered as low-cost / must-run power sources and since the quantity of electricity supplied to the grid by these individual sources is known, option B is applicable and used to calculate the Simple OM emission factor. $EF_{grid,OMsimple,y}$, using option B is calculated below 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 the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} * NCV_{i,y} * EF_{CO_2,i,y}}{EG_y} \quad [3]$$

Table 13. Explanations of parameters used for calculations

Parameter	Explanation
$EF_{grid,OMsimple,y}$	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)
$EF_{CO_2,i,y}$	CO ₂ emission factor of fossil fuel type i in year y (tCO ₂ /GJ)

EG _y	Most recent historical year for which power generation data is available
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

Table 14. Calculation of the OM emission factor

Operating Margin Emission Factor	2008	2009	2010
Emissions [ktCO ₂]	103,533	97,982	98,517
Net electricity delivered, excl. lc-mr [GWh]	157,558	150,810	150,510
Emission Factor [tCO ₂ /MWh]	0.657	0.650	0.655
Weight of generation, %	34.3%	32.9%	32.8%
Operating Margin [tCO ₂ /MWh]	0.654		

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

According to the “Tool to calculate the emission factor for an electricity system”, the sample group of power units m used to calculate the build margin should be determined as per the following procedure:

- 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 (SET_{5-units}) and determine their annual electricity generation (AEG_{SET-5-units}, in MWh);

The following power plants are selected as the SET_{5-units} which are taken into operation most recently;

Table 15. Selected SET_{5-units}⁶

Name of the power plant	Capacity [MW]	Generation [GWh]
POLYPLEX EUROPA POLYESTER FİLM	7.808	61.1
ALTEK ALARKO ELEKTRİK SANTRALLARI	21.89	151.4
RASA ENERJİ (VAN) (İlave)	10.124	64.4
EREN ENERJİ ELEKTRİK ÜR. A.Ş. (İlave)	600	4005.9
INTERNATIONAL HOSPITAL İSTANBUL AŞ.	0.77	5.8
AEG_{SET5-units} [GWh]		4,289

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

The data of the most recent commissioned power plants are being published by the Turkish Electricity Transmission Company (TEIAS) on an annual basis. In order to meet the 20% threshold, recently built power plants between 2006 and 2010 are included in the cohort. The threshold requirement is satisfied;

⁶ Source: TEIAS Capacity Projection Report 2010
(<http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf>)

Table 16. Generation of Recent Capacity Additions⁷

Selection of the Sample Power Plant List	
UNFCCC Threshold	20%
System Generation ⁸ [GWh]	211,208
Minimum Threshold (20%)	42,242
Total of selected power plants [GWh]	42,514

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

Based on the “Tool to calculate the emission factor for an electricity system”, $SET_{\geq 20\%}$ is larger than $SET_{5-units}$ and is selected as the SET_{sample} . SET_{sample} is used to calculate the build margin, as none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago. In this selection, those power plants are not included that are capacity additions or reductions, performance revisions, retrofits, isolated plants, dismantlings or carbon projects. The final list of the cohort of power plants is available in the **Appendix 4** for further details.

The “Tool to calculate the emission factor for an electricity system” offers the choice between two data vintages to calculate the BM:

- 1) Option 1. For the first crediting period, BM emission factor is calculated ex-ante based on the most recent information available on units already built for sample group m at the time of PDD submission to the DOE for validation, or,
- 2) Option 2. For the first crediting period, the BM emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity.

Option 1 is selected. This data vintage remains fixed during the first crediting period and will be updated for the second crediting period.

No recent or future addition to the national transmission capacity is reported or foreseen, which would enable Turkey to significantly increase its electricity imports. Therefore, a likely transmission line construction is not considered in BM emission factor calculations.

For the power units in Turkey, only data on electricity generation and the fuel types used are available. Therefore, Option A2 (as in Step 4, Simple OM approach) is used and the emission factor is determined based on the CO₂ emission factor of the fuel type used and the efficiency of the power unit.

The build margin emission factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows;

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad [4]$$

⁷ Source: TEIAS annual capacity projection reports

(<http://www.teias.gov.tr/KAPASITE%20PROJEKSIYONU%202005.pdf>,
<http://www.teias.gov.tr/KAPASITE%20PROJEKSIYONU%202006.pdf>,
www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202007.pdf,
<http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2008.pdf>,
<http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf>,
<http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf>,
<http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf>)

⁸ Source: TEIAS

([http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim\(22-45\)/35\(75-10\).xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/35(75-10).xls))

Table 17. Explanations of parameters used for calculations

Parameter	Explanation
$EF_{grid, BM, y}$	Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EG_{m, y}$	Net quantity of electricity 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

Calculations for the BM emission factor $EF_{grid, BM, y}$ is based on the most recent information available on the plants already built for sample group m at the time of PDD submission. Using the sample list of recently built power plants, the Build Margin Emission Factor, $EF_{grid, BM}$ is found as;

Table 18. Calculation of the BM emission factor

Capacity Additions	Total Generation [GWh]	Indicative Efficiency ⁹	Emission Intensity [tCO ₂ /TJ] ¹⁰	Emissions [ktCO ₂]	Build Margin [tCO ₂ /MWh]
Coal	9,080	39%	89.5	7,501	
Lignite	2,511	39%	90.9	2,107	
Fuel Oil	2,414	46%	75.5	1,427	
Diesel Oil	0	46%	72.6	0	
LPG	0	60%	61.6	0	
Naphtha	0	46%	69.3	0	
Natural Gas	22,762	60%	54.3	7,416	
Renewables	45		0	0	
Hydro	5,010		0	0	
Geothermal & Wind	692		0	0	
Total	42,514			18,451	0.434

Power plant-specific data are unavailable in Turkey; therefore CO₂ emissions are calculated based on fuel type consumed in sample power plants/units.

Step 6. Calculate the combined margin emissions factor

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

- Weighted average CM; or
- Simplified CM.

The combined margin (CM) emissions factor ($EF_{grid, CM, y}$) is calculated as a *weighted average* of Operating Margin emission factor and Build Margin emission factor as follows:

$$EF_{grid, CM, y} = w_{OM} * EF_{grid, OM, y} + w_{BM} * EF_{grid, BM, y} \quad [5]$$

⁹ Source: UNFCCC “Tool to calculate emission factor for an electricity system” , Annex 1

¹⁰ Source: Lower values in the IPCC 2006 Guidelines V2, Ch1, Table 1.4

Table 19. Explanations of parameters used for calculations

Parameter	Explanation
$EF_{grid,CM,y}$	Combined margin CO ₂ emissions factor in year y (tCO ₂ /MWh)
$EF_{grid,BM,y}$	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}	Weight of operating margin emissions factor (0.75 by default)
W_{BM}	Weight of build margin emissions factor (0.25 by default)

$$EF_{grid,CM,y} = 0.75 * 0.654 \text{ tCO}_2/\text{MWh} + 0.25 * 0.434 \text{ tCO}_2/\text{MWh} = 0.599 \text{ tCO}_2/\text{MWh}$$

B.6.2. Data and parameters fixed ex ante

Data / Parameter	Fuel heating values
Unit	Tcal
Description	Total energy content of fuels consumed for power generation
Source of data	TEIAS ¹¹
Value(s) applied	Table 23
Choice of data or Measurement methods and procedures	These are 2006-2010 official heating value data of fuels used for power generation in Turkey.
Purpose of data	Calculation of combined margin emission factor.
Additional comment	

Data / Parameter	Fuel consumption
Unit	Tons, or 1000 m ³
Description	Amounts of fuels consumed by power generation facilities in Turkey
Source of data	TEIAS ¹²
Value(s) applied	Table 22. Fuel Amounts Consumed for Power Generation,
Choice of data or Measurement methods and procedures	These are 2007-2010 official fuel consumption data used for power generation in Turkey.
Purpose of data	Calculation of combined margin emission factor.
Additional comment	

¹¹ <http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/49.xls>

¹² <http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/47.xls>

Data / Parameter	Net calorific value
Unit	TJ/kt or TJ/mil m3
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	Calculation: By dividing the heating value to fuel consumption value
Value(s) applied	Table 24
Choice of data or Measurement methods and procedures	The net calorific values are calculated from fuel heating values and fuel consumption values which are both taken from annually published data of TEIAS.
Purpose of data	Calculation of combined margin emission factor.
Additional comment	

Data / Parameter	$GEN_{j,y}$
Unit	MWh
Description	The gross electricity generation by fuel type j in year y (2006-2010) by the system
Source of data	TEIAS ⁸
Value(s) applied	Table 12 The sum of of $GEN_{j,y}$ for each fuel type in year y gives the System Gross Electricity Generation _y .
Choice of data or Measurement methods and procedures	TEIAS annually publishes official data regarding electricity generation and is the only source that provides information with most details.
Purpose of data	Calculation of combined margin emission factor.
Additional comment	

Data / Parameter	System Net Electricity Generation _y
Unit	MWh
Description	The difference between the total quantity of electricity generated by power plants/units and the auxiliary electricity consumption of power plants/units.
Source of data	TEIAS ⁵
Value(s) applied	Table 12
Choice of data or Measurement methods and procedures	TEIAS annually publishes official data regarding electricity generation and is the only source that provides information with most details.
Purpose of data	Calculation of combined margin emission factor.
Additional comment	

Data / Parameter	Net Delivery Ratio _y
Unit	%
Description	The ratio of the System Net Electricity Generation to the System Gross Electricity Generation in year y.
Source of data	Calculation: By dividing System Net Electricity Generation _y by System Gross Electricity Generation _y
Value(s) applied	Table 12
Choice of data or Measurement methods and procedures	Electricity delivered to the grid by each power plant/unit is unavailable. The Net Delivery Ratio _y is used for approximating the net electricity amount delivered to the grid by power plants/units except lc-mr sources.
Purpose of data	Calculation of combined margin emission factor.
Additional comment	This is a conservative assumption, since in general thermal power plants consume more energy for auxiliaries than e.g. hydro plants.

Data / Parameter	GEN _y
Unit	MWh
Description	The system net electricity delivered in year y by the total of all power plants in the grid, excluding lc-mr sources.
Source of data	Calculation: 1. Gross electricity generation excluding lc-mr sources = Total gross electricity generation from all sources - total gross electricity generation from lc-mr sources 2. Net electricity generation excluding lc-mr sources = Gross electricity generation except lc-mr sources * Net Delivery Ratio Net electricity delivered to the grid except lc-mr sources = Net electricity generation except lc-mr sources + Imports
Value(s) applied	Table 12
Choice of data or Measurement methods and procedures	Net electricity delivered to the grid by each power plant/unit or by fuel type is unavailable. Therefore this parameter is approximated by calculations.
Purpose of data	Calculation of combined margin emission factor.
Additional comment	

Data / Parameter	$EF_{CO_2,i,y}$
Unit	tCO ₂ /TJ
Description	CO ₂ emission factor of fossil fuel type i in year y
Source of data	The lower limits of the 95% confidence interval stated in the “2006 IPCC Guidelines for National Greenhouse Gas Inventories”, Volume 2, Chapter 1 (energy) Table 1.4.
Value(s) applied	Table 18
Choice of data or Measurement methods and procedures	This is in line with the “Tool to calculate the emission factor for an electricity system”.
Purpose of data	Calculation of operating margin and build margin.
Additional comment	

Data / Parameter	Electricity Import _y
Unit	GWh
Description	Net electricity imports delivered to the grid in year y
Source of data	TEIAS ⁵
Value(s) applied	Table 12
Choice of data or Measurement methods and procedures	
Purpose of data	Calculation of combined margin emission factor.
Additional comment	This is the total electricity imported and delivered to the national grid from connected electricity systems from neighbour countries.

Data / Parameter	$\eta_{m,y}$
Unit	%
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	UNFCCC methodological tool “Tool to calculate the emission factor for an electricity system” Annex I
Value(s) applied	Table 18
Choice of data or Measurement methods and procedures	Default efficiency figures represent best available techniques and should be considered to be conservative.
Purpose of data	Calculation of combined margin emission factor.
Additional comment	There are no official efficiency values available for recent power plants based on each power plant or each fuel type. Therefore default values are assumed.

B.6.3. Ex ante calculation of emission reductions

The baseline emissions (BE_y) are obtained as:

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y} \quad [6]$$

Where:

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

$$EF_{CO_2,grid,y} = EF_{grid,CM,y}$$

Table 20. Explanations of parameters used for calculations

Parameter	Explanation
BE_y	Baseline emissions in year y (tCO_2)
$EG_{BL,y}$	Quantity of net electricity supplied to grid by the Project activity in year y (MWh)
$EF_{CO_2,grid,y}$	CO_2 emission factor of the grid (tCO_2/MWh)
$EG_{facility,y}$	Quantity of net electricity supplied to grid by the Project plant in year y (MWh/a)
$EF_{grid,CM,y}$	Combined margin CO_2 emissions factor in year y (tCO_2/MWh)

$$BE_y = 112,000 \text{ MWh} * 0.599 \text{ tCO}_2/\text{MWh} = 67,074 \text{ tCO}_2$$

Project Emissions (PE_y): The proposed Project is the installation of a new wind farm project, thus project emissions are zero in accordance with the methodology ACM0002. The Project does not include any other emission source that contributes by more than 1% of the emission reductions by the Project.

Leakage (L_y): As per the methodology ACM0002, the leakage shall not be considered.

Thus the emission reductions per year are estimated as;

$$ER_y = BE_y - PE_y = \mathbf{67,074 \text{ tCO}_2} \quad [7]$$

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

Year	Baseline emissions (t CO₂e)	Project emissions (t CO₂e)	Leakage (t CO₂e)	Emission reductions (t CO₂e)
2013 (Partial)	36,937	0	0	36,937
2014	67,074	0	0	67,074
2015	67,074	0	0	67,074
2016	67, 074	0	0	67, 074
2017	67, 074	0	0	67, 074
2018	67, 074	0	0	67, 074
2019	67, 074	0	0	67, 074
2020 (Partial)	30,138	0	0	30,138
Total	469,520	0	0	469,520
Total number of crediting years	7			
Annual average over the crediting period	67,074	0	0	67,074

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	EG _{facility,y}
Unit	kWh
Description	Net electricity supplied to the grid by the Project activity in year y
Source of data	Primary source: PMUM web site Secondary source: Invoices and/or TEIAS settlement documents
Value(s) applied	112,000 MWh
Measurement methods and procedures	Measurement will be carried out by accurate electricity meters. The collected data will be, once approved by TEIAS, used to calculate the net electricity supplied by the Project.
Monitoring frequency	The primary and back-up measurement devices measure, read and record various data such as electricity generated and consumed, in real-time. The measurements and recordings are made continuously. The readings are performed in monthly intervals.
QA/QC procedures	There will be no sampling and all measured data will be used for monitoring. Measurement equipment will be calibrated and their accuracy will be ensured by TEIAS. Both measurement devices will be approved by TEIAS, and the calibration will also be managed by TEIAS. According to the “Communiqué for Metering Devices to be used in the Electricity Market”, Article 9, paragraph b, the periodic calibration shall be made every 10 years¹³. Both the primary and secondary devices are sealed during first operation of the plant. In case there is a significant inconsistency (assessed by TEIAS) between two devices, the meters will be calibrated by TEIAS before the 10 years period. The Project owner can also request calibration of the meter(s). The calibration stations are inspected by the central organization of the same Ministry¹⁴. Both metering instruments are sealed and only accessible by TEIAS personnel. PMUM data is also of high quality, as the data is used for invoicing purposes and is accessible online by the Project owner, minimizing the risks of data corruption, data archiving, loss of information etc. Generation figures from PMUM reports will be copied-pasted to the spreadsheet to prevent potential typos.
Purpose of data	Calculation of baseline emissions or baseline net GHG removals by sinks.

¹³ “Communiqué for Metering Devices to be used in the Electricity Market”, Article 9, paragraph b. (Document already submitted to the DOE.)

¹⁴ Source: “Communiqué for Metering Devices to be used in the Electricity Market”, Article 10



Additional comment	The metering devices do not measure the net electricity generation but the gross generation and self consumption separately. Concerning invoicing, TEIAS deducts a certain amount of electricity supplied to the grid by the Project in order to compensate its transmission line losses in its national grid. According to ACM0002, emissions reductions are based on net electricity supplied to the grid, therefore this deduction is not considered in the monitoring calculations.
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B.7.2. Sampling plan

N/A

B.7.3. Other elements of monitoring plan

N/A

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

The definition of "starting date" is set out in the CDM Glossary of Terms as the earliest date at which either the implementation or construction or real action of a project activity begins. The mobilisation for construction of the Project activity has started on 03.09.2012. The equipment order has been signed on 28.02.2012. The loan agreement is signed on 19.12.2012. The earliest of these dates is the turbine order date. Therefore the starting date of the Project activity is 28.02.2012.

C.1.2. Expected operational lifetime of project activity

The Project is licensed by EMRA for a time period of 49 years and 0 months, which is the operational lifetime of the Project activity. Technical lifetime of the Project is 25 years according to the UNFCCC methodological tool "Tool to determine the remaining lifetime of equipment", v.1.

C.2. Crediting period of project activity

C.2.1. Type of crediting period

The Project activity will use a renewable crediting period.

The 7-years crediting period may be renewed at most two times.

C.2.2. Start date of crediting period

The starting date of the first crediting period is 01.05.2013.

C.2.3. Length of crediting period

7 years and 0 months.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

The Project activity is expected to contribute to sustainable development in the following ways:

- Reduction of electricity imports and dependency on fossil fuels;
- Improvement of energy security (by lowering sensitivity to energy prices and supply fluctuations) and infrastructure (in terms of electricity supply quality and continuity);
- Reduction of greenhouse gas emissions;
- Reduction of air pollutants (e.g. particulates, sulphur dioxide, nitrogen oxides etc.) and related side effects on biodiversity;
- Creation of new jobs during planning, construction and operation phases;
- Support to local economy by procuring available services and equipment locally;
- Support to technology and know-how transfer and promotion of the renewable energy sector in Turkey.

As one of the cleanest and most sustainable renewable energy generation technologies, wind energy projects generally pose no significant environmental impacts. No trans-boundary impact related to the construction and operation of the Project is expected.

In the host country, wind power projects are required to submit an EIA Project Identification File (EIA PIF), rather than a complete EIA report. Only in specific cases where the environmental impacts could be sensitive, an EIA report is requested. The Project has assigned an accredited company for the preparation of the EIA PIF and has received the EIA permit (a document for EIA exemption) as of 26.01.2012.

D.2. Environmental impact assessment

The emissions of all kinds of pollutants generated by the proposed Project meet the requirements of the national standards. The Project will not have any significantly negative impacts on the surrounding environment. The Project will comply with all relevant environment related laws and regulations. As a voluntary commitment, the Project owner will also develop and apply an environmental monitoring plan to ensure the environmental integrity of the Project.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

The project owner is in continuous contact with local people in the area. The standard EIA process in the host country involves a stakeholder consultation meeting. Since the project is exempt from an EIA procedure, a mandatory EIA stakeholder meeting has not been organised.

The Local Stakeholder Consultation meeting following the procedures and guidance of Gold Standard v.2.1 Toolkit has been organized in the Village Chamber of the Elmalı Village (closest village to the Project site) on 20.06.2012. Identified stakeholders are invited through different ways of communication such as post, e-mail or fax. They are also (mostly) contacted via phone to inform or confirm the delivery of the invitations. Apart from these, other media such as newspapers and wall announcements are also used for public announcement.

E.2. Summary of comments received

The Project does not result in any involuntary resettlement in the region. Feedbacks the Project owner informally receives from local communities suggest that the stakeholders are in general supportive for the Project and are mostly interested in employment opportunities the Project might create.

As for the LSC meeting, the outcomes of the meeting can be summarized as following:

- The meeting was carried out such that participants could freely suggest their own ideas about the Project. The meeting is conducted with a satisfactory organization and the free-speech atmosphere of the meeting was not disturbed by any participant.
- Stakeholders are already knowledgeable in the wind power technology. In general, participants believe that the Project will have a contributing role. After the consultation process, there is no outstanding issue left and the stakeholders are satisfied with the answers they received and the Project itself. In general, local participants are positive and supportive for the Project.

E.3. Report on consideration of comments received

The comments of stakeholders are positive and do not require the Project owner to take due account.



SECTION F. Approval and authorization

N/A.

**Appendix 1: Contact information of project participants**

Organization name	Çanres Elektrik Üretim A.Ş.
Street/P.O. Box	Kısıklı Caddesi Sarkuysan–Ak İş Merkezi No:4 A-Blok Kat:1 34662 Altunizade – Üsküdar
Building	
City	İstanbul
State/Region	
Postcode	34662
Country	Turkey
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Appendix 2: Affirmation regarding public funding



07.06.2012

Project reference: *Sadilli Wind Farm Project, Turkey*

To: Gold Standard Foundation

Declaration of Non-Use of Official Development Assistance by Project Owner

Çanres Elektrik Üretim A.Ş.:

As Project Owner of the above-referenced project, acting on behalf of all project participants, I now make the following representations:

Mavi Sürdürülebilir Kalkınma Proje ve Danışmanlık Hiz. Ltd. Sti. ("Mavi Consultants");

I hereby declare that I am duly and fully authorised by the project owner of the above-referenced project, acting on behalf of all project participants, to make the following representations on Project Proponent's behalf:

I. Gold Standard Documentation

I am familiar with the provisions of Gold Standard Documentation relevant to Official Development Assistance (ODA). I understand that the above-referenced project is not eligible for Gold Standard registration if the project receives or benefits from Official Development Assistance under the condition that some or all credits coming out of the project are transferred to the ODA donor country. I now expressly declare that no financing provided in connection with the above-referenced project has come from or will come from ODA that has been or will be provided under the condition, whether express or implied, that any or all of the credits [CERs, ERUs or VERs] issued as a result of the project's operation will be transferred directly or indirectly to the country of origin of the ODA.

II. Duty to Notify Upon Discovery.

If I learn or if I am given any reason to believe at any stage of project design or implementation that ODA has been used to support the development or implementation of the project, or that an entity providing ODA to the host country may at some point in the future benefit directly or indirectly from the credits generated from the project as a condition of investment, I will make this known to the Gold Standard immediately.

III. Sanctions. I am fully aware that under Section 10 of the Gold Standard Terms and Conditions sanctions and damages may be incurred for the provision of false information related to Projects and/or Gold Standard credits.

Signed:

Name: *Mr. Karani Güleç*

Title: *Board Chairman*

On behalf of: *Çanres Elektrik Üretim A.Ş.*

Mr. Koray Kıymaz

Board Member

A Çanres Elektrik Üretim A.Ş.
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Appendix 3: Applicability of selected methodology

Please refer to Section B.2 of this report.

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

Table 21. Baseline Information (SET_{SAMPLE})

POWER PLANT	CAPACITY [MW]	GENERATION [GWh]
2006 Capacity Additions		
ELBISTAN B GR IV	360.0	2340.0
ÇIRAĞAN SARAYI GR I	1.3	11.0
ERTÜRK ELEKTRİK Tepe RES GR I	0.9	2.0
AKMAYA (Lüleburgaz) GR I	6.9	50.0
BURGAZ (Lüleburgaz) GR I	6.9	54.0
SEYHAN I-II	0.3	1.7
ŞANLIURFA GR I-II	51.8	124.0
BEREKET ENERJİ GÖKYAR HES 3 Grup	11.6	43.3
MOLU EN. Zamanlı Bahçelik GR I - II	4.2	16.7
SU ENERJİ (Balıkesir) GR I - II	4.6	20.7
BEREKET EN.(Mentaş Reg) GR I - II	26.6	108.7
EKİN (Başaran Hes) (Nazilli)	0.6	4.5
ERE(Sugözü rg. Kızıldüz hes) GR I - II	15.4	31.6
ERE(AKSU REG.ve ŞAHMALLAR HES) GR I-II	14.0	26.7
BEREKET EN.(Mentaş Reg) GR III	13.3	54.4
2007 Capacity Additions		
HABAŞ (Aliğa-ilave)	9.1	62.0
MODERN ENERJİ	5.2	35.5
ARENKO	0.7	4.8
ALTINMARKA GIDA	0.1	0.7
TEKBOY ENERJİ	0.1	0.7
VELSAN AKRİLİK	0.1	0.7
Acıbadem Sağlık Hiz.ve Tic.A.Ş.(Kadıköy Hast.)(İstanbul/Kadıköy)	0.5	3.4
Acıbadem Sağlık Hiz.ve Tic.A.Ş.(Kozyatağı Hast.)(İstanbul/Kadıköy)	0.6	4.1
Acıbadem Sağlık Hiz.ve Tic.A.Ş.(Nilüfer/BURSA)	1.3	8.9
AKATEKS Tekstil Sanayi ve Ticaret A.Ş.	1.8	12.3
FLOKSER TEKSTİL SAN.AŞ.(Çatalca/İstanbul)(Poliser Tesisi)	2.1	14.3
FLOKSER TEKSTİL SAN.AŞ.(Çatalca/İstanbul)(Süetser Tesisi)	2.1	14.3
FRİTOLAY GIDA SAN.VE TİC. AŞ.	0.5	3.4
KIVANÇ TEKSTİL SAN.ve TİC.A.Ş.	3.9	26.6
KİL-SAN KİL SAN.VE TİC. A.Ş	3.2	21.8
SÜPERBOY BOYA SAN.ve Tic.Ltd.Şti.(Büyükçekmece/İstanbul)	1.0	6.8
SWİSS OTEL(Anadolu Japan Turizm A.Ş (İstanbul)	1.6	10.9
TAV Esenboğa Yatırım Yapım ve İşletme AŞ./ANKARA	3.9	26.6
NUH ENERJİ-2(Nuh Çim.)	73.0	497.7
AKTEKS	0.8	5.9
UŞAK ŞEKER (NURİ ŞEKER)	1.7	12.8
BOĞAZLIYAN ŞEKER	16.4	111.8
KARTONSAN	5.0	34.1
ESKİŞEHİR END.ENERJİ	3.5	23.9
ESKİŞEHİR ŞEKER (KAZIM TAŞKENT)	2.9	19.8
İGSAŞ	2.2	15.0
DESA	0.7	4.8
DENTAŞ	0.3	2.0
SÜPER FİLMCİLİK	0.1	0.7
ATAER ENERJİ	0.1	0.7
BİL ENERJİ	0.1	0.7
BİS Enerji Üretim AŞ.(Bursa)(İlave)	43.0	293
Aliğa Çakmaktepe Enerji A.Ş.(Aliğa/İZMİR)	34.8	237



BİS Enerji Üretim AŞ.(Bursa)(İlave)	48.0	327
BOSEN ENERJİ ELEKTRİK AŞ.	142.8	974
SAYENERJİ ELEKTRİK ÜRETİM AŞ. (Kayseri/OSB)	5.9	40
T ENERJİ ÜRETİM AŞ.(İSTANBUL)	1.6	11
ZORLU EN.Kayseri (İlave 1 GT)	7.2	49
SIİRT	25.6	190
Mardin Kızıltepe	34.1	250
KAREN	24.3	180
İDİL 2 (PS3 A- 2)	24.4	180
BORÇKA HES	300.6	1203
YPM Ener.Yat.AŞ.(Altıntepe Hidro.)(Sivas/Suşehir)	4.0	16
YPM Ener.Yat.AŞ.(Beypınar Hidro.)(Sivas/Suşehir)	3.6	14
YPM Ener.Yat.AŞ.(Konak Hidro.)(Sivas/Suşehir)	4.0	16
KURTEKS Tekstil A.Ş./Kahramanmaraş(KARASU HES-Andırın)	2.4	10
İSKUR TEKSTİL (SÜLEYMANLI HES)	4.6	18
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)	6.3	25
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)(İlave)	6.3	25
2008 Capacity Additions		
MB ŞEKER NIŞASTA SAN. A.Ş. (Sultanhanı)	8.8	60.0
AKSA ENERJİ (Antalya)	183.8	1290.0
AKSA ENERJİ (Manisa)	52.4	370.0
ANTALYA ENERJİ (İlave)	17.5	122.3
ATAÇ İNŞAAT SAN. A.S.B. (ANTALYA)	5.4	37.0
BAHÇIVAN GIDA(LÜLEBURGAZ)	1.2	8.0
CAN ENERJİ (Çorlu-TEKİRDAĞ)(İlave)	52.4	304.2
FOUR SEASONS OTEL (ATİK PASHA TUR.A.Ş.)	1.2	7.0
FRİTOLAY GIDA SAN. VE TİC. A.Ş. (İlave)	0.1	4.0
KARKEY (SİLOPİ-5)(154kV)(İlave)	14.8	103.2
MELİKE TEKSTİL (GAZİANTEP)	1.6	11.0
MİSİS APRE TEKSTİL BOYA EN. SAN.	2.0	14.0
MODERN ENERJİ (LÜLEBURGAZ)	13.4	94.1
ORTADOĞU ENERJİ (ODA YERİ)(Eyüp-İst)	2.8	22.0
POLAT TURZ. (POLAT RENAISSANCE İST.OT.)	1.6	11.0
SARAYKÖY JEOTERMAL(DENİZLİ)	6.9	50.0
YILDIZ SUNTA (Uzunçiftlik-Köseköy)(Düzeltilme)	22.6	146.5
SÖNMEZ Elektrik (İlave)	8.7	67.3
AKKÖY ENERJİ (AKKÖY I HES)	101.9	408.0
ALP ELEKTRİK (TINAZTEPE) ANTALYA	7.7	29.0
CANSU ELEKTRİK (Murgul/ARTVİN)	9.2	47.0
DAREN HES ELKT. (SEYRANTEPE BARAJI VE HES)	49.7	182.0
DEĞİRMENÜSTÜ EN. (KAHRAMANMARAŞ)	25.7	69.0
GÖZEDE HES (TEMSA ELEKTRİK) BURSA	2.4	10.0
H.G.M. ENERJİ (KEKLİCEK HES) (Yeşilyurt)	8.7	18.0
HİDRO KNT.(YUKARI MANAHOZ REG.VE HES)	22.4	79.0
İÇ-EN ELK.(ÇALKIŞLA REGÜLATÖRÜ VE HES)	7.7	18.0
KALEN ENERJİ (KALEN II REGÜLAT. VE HES)	15.7	50.0
MARAŞ ENERJİ (FIRNIS REGÜLATÖRÜ VE HES)	7.2	36.0
SARMAŞIK I HES (FETAŞ FETHİYE ENERJİ)	21.0	96.0
SARMAŞIK II HES (FETAŞ FETHİYE ENERJİ)	21.6	108.0
TORUL	105.6	322.0
YEŞİL ENERJİ ELEKTRİK (TAYFUN HES)	0.8	5.0
2009 Capacity Additions		
AK GIDA SAN. VE TİC. A.S. (Pamukova)	7.5	61.0
AKSA AKRİLİK KİMYA SN. A.S. (YALOVA)	70.0	539.0
AKSA ENERJİ (Antalya) (İlave)	300	0
AKSA ENERJİ (Antalya) (İlave)	300	0



AKSA ENERJİ (MANİSA) (İlave)	10.5	0
AKSA ENERJİ (MANİSA) (İlave)	52.4	0
AKUA ENERJİ (KAYALIK REG. VE HES)	5.8	39.0
ALKİM ALKALİ KİMYA (Cihanbeyli/KONYA)	0.4	3.0
ANTALYA ENERJİ (İlave)	41.8	0
ARENKO ELEKTRİK ÜRETİM A.Ş. (Denizli)	12.0	84.0
BEREKET ENERJİ (KOYULHİSAR RES)	42.0	329.0
BİL ENERJİ (DG+M) (Balgat)	36.6	0
CAM İŞ ELEKTRİK (Mersin) (İlave)	126.1	0
CARGILL TARIM VE GIDA SAN. TİC. A.Ş.	0.1	1.1
CİNDERE HES (Denizli)	19.1	58.0
ÇELİKLER TAAH. İNŞ. (RİXOX GRAND)	2.0	16.0
DALSAN ALÇI SAN. VE TİC. A.Ş.	1.2	9.0
DELTA ENERJİ ÜRETİM VE TİC. A.Ş.	47.0	365.8
DELTA ENERJİ ÜRETİM VE TİC. A.Ş. (İlave)	13	101.1833333
DENİZLİ ELEKTRİK (EGE I HES)	0.9	4.0
DESA ENERJİ ELEKTRİK ÜRETİM A.Ş.	9.8	70.0
E.ŞEHİR END. ENERJİ (DG+M) (Eskişehir-2)	59.0	452.0
EGE BİRLEŞİK ENERJİ (LPG+DG+M) (Aliğa)	12.8	107.0
ERDEMİR (Ereğli-Zonguldak)	39.2	240.0
ERVA ENERJİ (KABACA REG. VE HES)	4.2	16.3
ERVA ENERJİ (KABACA REG. VE HES)	4.2	16.3
FALEZ ELEKTRİK ÜRETİMİ A.Ş.	11.7	88.0
GLOBAL ENERJİ (PELİTLİK)	8.6	65.7
GÜL ENERJİ ELKT.ÜRET. SN. VE TİC. A.Ş.	24.3	170.0
GÜRMAT ELEKT. (GÜRMAT JEOTERMAL)	47.4	313.0
İÇDAŞ ÇELİK (İlave)	135	0
İÇDAŞ ÇELİK (İlave)	135	0
KALEN ENERJİ (KALEN I-II HES)	15.7	52.2
KASAR DUAL TEKSTİL SAN. A.Ş. (Çorlu)	5.7	38.0
KAYEN ALFA ENERJİ (KALETEPE HES)	10.2	37.0
KEN KİPAŞ ELEKTRİK ÜRETİM (KAREN)	41.8	180.0
KEN KİPAŞ ELKT. ÜR. (KAREN) (K.Maraş)	17.5	75.4
KONYA ŞEKER SAN. VE TİC. A.Ş.	1.6	9
MARMARA PAMUKLU MENS. SN. TİC. A.Ş.	34.9	0
MAURİ MAYA SAN. A.Ş.	0.3	2.5
MAURİ MAYA SAN. A.Ş.	2.0	16.5
NUH ÇİMENTO SAN. TİC. A.Ş. (Nuh Çim.) (İlave)	47	0
ÖZYAKUT ELEK. ÜR. A.Ş. (GÜNEŞLİ HES)	0.6	2.7
ÖZYAKUT ELEK. ÜR. A.Ş. (GÜNEŞLİ HES)	1.2	5.3
RASA ENERJİ (VAN)	78.6	500.0
SARITEPE HES (GENEL DİNAMİK SİS. EL.)	2.5	10.2
SARITEPE HES (GENEL DİNAMİK SİS. EL.)	2.5	10.2
SELKASAN KAĞIT PAKETLEME MALZ. İM.	9.9	73.0
SİLOPİ ELEKTRİK ÜRETİM A.Ş.	135.0	945.0
SİLOPİ ELEKTRİK ÜRETİM A.Ş. (ESENBOĞA)	44.8	315.0
SÖNMEZ ELEKTRİK (Uşak) (İlave)	8.7	0
TAŞOVA YENİDEREKÖY HES (HAMEKA A.Ş.)	2.0	10.0
TAV İSTANBUL TERMİNAL İŞLETME A.Ş.	3.3	27.6
TAV İSTANBUL TERMİNAL İŞLETME A.Ş.	6.5	54.4
TESKO KİPA KİTLE PAZ. TİC. VE GIDA A.Ş.	2.3	18.0
TOCAK I HES (YURT ENERJİ ÜRETİM SN.)	4.8	13.0
YURTBAY ELEKTRİK ÜRETİM A.Ş. (D.G.+M)	6.9	50.0
ZORLU ENERJİ (B.Karıştran) (İlave)	49.5	395.0
2010 Capacity Additions		
KULP IV HES (YILDIZLAR EN.ELK.ÜR.AŞ.)	12.298	41.0
CİNDERE HES (İlave)	9.065	28.3

ETİ SODA ÜRE.PAZ.NAK.VE ELK.ÜRE.SAN.	24	144.0
CAN TEKSTİL (Çorlu/TEKİRDAĞ)	7.832	60.2
ALTINMARKA	4.6	37.0
BAYBURT HES (BAYBURT ENERJİ ÜRET.)	14.631	51.1
ALAKIR HES (YURT ENERJİ ÜRETİM)	2.06	5.9
AKBAŞLAR (İlave)	1.54	12.1
PETA MÜHENDİSLİK EN. (MURSAL II HES)	4.5	19.0
HETAŞ HACISALİHOĞLU (YILDIZLI HES)	1.2	5.0
GLOBAL ENERJİ (PELİTLİK)	3.544	27.1
KONYA ŞEKER SAN. VE TİC. A.Ş.	6	11.6
RASA ENERJİ (VAN)	26.19	166.6
DOĞUBAY ELEKTRİK (SARİMEHMET HES)	3.1	10.0
AKSA ENERJİ (ANTALYA)	25	192.5
NURYOL ENERJİ (DEFNE REG. VE HES)	7.23	22.1
BİRİM HİDR. ÜRETİM AŞ. (ERFELEK HES)	3.225	9.4
FIRTINA ELEKTRİK ÜR. A.Ş. (SÜMER HES)	21.6	70.0
FRİTOLAY GIDA SAN.VE TİC A.Ş.	0.065	0.4
YILDIZ ENTEGRE AĞAÇ (Kocaeli)	12.368	79.8
ATAER ENERJİ ELEKTRİK ÜRETİM A.Ş.	49	277.9
BİRİM HİDR. ÜRETİM AŞ. (ERFELEK HES)	3.225	9.4
CENGİZ ENERJİ SAN. VE TİC. A.Ş. (Tekkeköy)	101.95	802.0
ERENLER REG. ve HES (BME BİR.MÜT.EN.)	45	85.0
UĞUR ENERJİ ÜRETİM TİC. VE SAN. A.Ş.	48.2	405.1
ÇAMLIKAYA REG. VE HES	5.648	19.2
AKSA ENERJİ (ANTALYA)	25	192.5
DİNAR HES (ELDA ELEKTRİK ÜRETİM)	4.44	15.1
DİM HES (DİLER ELEKTRİK ÜRETİM)	38.25	122.8
ALTEK ALARKO ELEKTRİK SANTRALLARI	60.1	415.6
YAVUZ REG. VE HES (MASAT ENERJİ)	22.5	83.0
EREN ENERJİ ELEKTRİK ÜRETİM A.Ş.	160	1068.2
FLOKSER TEKSTİL (Çerkezköy/TEKİRDAĞ)	5.172	41.8
KAYABÜKÜ REG. VE HES (ELİTE ELEKT.)	14.58	48.9
RB KARESİ İTHALAT İHRACAT TEKSTİL	8.6	65.0
CENGİZ ENERJİ SAN. VE TİC. A.Ş. (Tekkeköy)	101.95	802.0
GÖK REG. ve HES (GÖK ENERJİ EL. SAN.)	10.008	43.0
KESKİNOĞLU TAVUKÇULUK VE DAM. İŞL.	3.495	25.0
BİNATOM ELEKTRİK ÜRETİM A.Ş.	2	13.0
CAN ENERJİ ELEKTRİK ÜR. A.Ş.(Tekirdağ)	29.1	203.0
KURTOĞLU BAKIR KURŞUN SAN. A.Ş.	1.585	11.9
GÜDÜL I REG. VE HES (YAŞAM ENERJİ)	2.36	13.8
SÖNMEZ ENERJİ ÜRETİM (UŞAK)	33.242	256.3
KARŞIYAKA HES (AKUA ENERJİ ÜRET.)	1.592	8.0
TEKTUĞ ELEKTRİK (ANDIRIN HES)	40.5	106.0
KOZAN HES (SER-ER ENERJİ)	4	9.0
KIRKA BORAKS(Kırka) (Eti Maden İşl.) (İlave)	10	65.9
KAHRAMAN REG. VE HES (KATIRCIOĞLU)	1.42	6.1
NARİNKALE REG. VE HES (EBD ENERJİ)	3.1	10.0
ENERJİ-SA (BANDIRMA)	1000	8100.6
UĞUR ENERJİ ÜR. TİC.VE SAN. A.Ş. (İlave)	12	100.9
ERENKÖY REG. VE HES (TÜRKERLER)	21.456	86.8
KAHTA I HES (ERDEMYILDIZ ELEK. ÜRT.)	7.12	35.1
SABUNSUYU II HES (ANG ENERJİ ELK.)	7.35	20.9
EREN ENERJİ ELEKTRİK ÜR. A.Ş. (İlave)	600	4005.9
MURGUL BAKIR (Ç.Kaya) (İlave)	19.602	40.5
MARMARA PAMUKLU MENSUCAT (İlave)	26.19	183.3
ALİAĞA ÇAKMAKTEPE ENERJİ (İlave)	69.84	557.9
FRİTOLAY GIDA SAN.VE TİC A.Ş. (İlave)	0.33	2.2

YEDİĞÖZE HES (YEDİĞÖZE ELEKTRİK)	155.33	474.1
SÖNMEZ ENERJİ ÜRETİM (UŞAK) (İlave)	2.564	19.8
TÜPRAŞ RAFİNERİ (İZMİT) (İlave)	40	258.8
POLYPLEX EUROPA POLYESTER FİLM	7.808	61.1
ALTEK ALARKO ELEKTRİK SANTRALLARI	21.89	151.4
RASA ENERJİ (VAN) (İlave)	10.124	64.4
EREN ENERJİ ELEKTRİK ÜR. A.Ş. (İlave)	600	4005.9
INTERNATIONAL HOSPITAL İSTANBUL AŞ.	0.77	5.8

Table 22. Fuel Amounts Consumed for Power Generation

Fuel Consumption Summary, t / 1000m ³	2007	2008	2009	2010
Coal	6,029,143	6,270,008	6,621,177	7,419,703
Lignite	61,223,821	66,374,120	63,620,518	56,689,392
Fuel Oil	2,250,686	2,173,371	1,594,321	891,782
Diesel Oil	50,233	131,206	180,857	20,354
LPG	0	0	111	0
Naphtha	11,441	10,606	8,077	13,140
Natural Gas	20,457,793	21,607,635	20,978,040	21,783,414

Table 23. Heating Values of Fossil Fuels

Heating Value, Tcal	2007	2008	2009	2010
Coal	32,115	33,310	35,130	39,546
Lignite	100,320	108,227	97,652	96,551
Fuel Oil	21,434	20,607	15,160	8,569
Diesel Oil	517	1,328	1,830	209
LPG	0	0	1	0
Naphtha	118	113	84	105
Natural Gas	179,634	189,057	186,266	194,487

Table 24. Net Calorific Values for Fuels Consumed for Power Generation

NCV [TJ/kt or TJ/mil m ³]	2007	2008	2009	2010
Coal	22.3	22.2	22.2	22.3
Lignite	6.9	6.8	6.4	7.1
Fuel Oil	39.8	39.7	39.8	40.2
Diesel Oil	43.1	42.3	42.3	43.1
Lpg	0.0	0.0	46.4	0.0
Naphta	43.2	44.6	43.6	33.5
Natural Gas	36.7	36.6	37.2	37.4

Appendix 5: Further background information on monitoring plan

Methodology:

For monitoring, the UNFCCC methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” v.13.0.0 is used. The GHG emission reductions are achieved through electricity generation by the Project. Therefore, the net electricity supplied by the Project, which is the difference of gross electricity generation and Project’s own electricity consumption, will be monitored. For this purpose, continuously collected electricity generation and consumption data will be reported and recorded monthly. Project emissions or leakage during crediting period will not be monitored.

The measured data are the monthly electricity generation and consumption values. These data are read and reported by TEIAS and can be called from the PMUM web site (OSOS system) after that month.

The Project activity itself consumes some amount of energy for operation. This amount is used from the generation of the Project, if the Project is operating. The remaining energy, gross generation is then supplied to the grid. Sometimes the Project will not be operating and taking some electricity from the grid for internal consumption, which is the consumption. Therefore there will be no data that shows internal consumption when the Project is in operation, as it is automatically deducted. The consumption data only shows the amount which is used from the grid. Both gross generation and consumption data are measured and recorded by the same measurement devices.

There will be two measurement devices on site that will continuously monitor electricity generation and consumption data and record them digitally. These readings can be called from the SCADA system, but the Project owner has no means to manipulate the readings or the measurement devices, as they will be sealed by TEIAS. On the first days of each successive month, power generation and consumption readings from both measurement devices will be read by TEIAS. The reading results are available at the PMUM web site, where the Project owner can easily access its daily and monthly power reports.

The electricity generation and consumption data that are recorded and reported during the monitoring period will be compiled using a spreadsheet program for verification purposes. This spreadsheet, along with documentary evidence, will be provided to the verifying DOE.

Procedure: The following procedure will be used to calculate the emission reductions:

The measurement instruments give two types of data (beside others); monthly gross electricity generated (power export) and monthly electricity consumed (power import) by the Project. The difference of these two parameters is the monthly net electricity supplied to the grid. These monthly net electricity supply values will be added up for all months during the monitoring period and the sum will be multiplied with the ex-ante CM emission factor to find the amount of emissions reductions. All the data will be electronically archived and communicated, and the calculations will be reported in a separate spreadsheet for verification purposes. The calculations will be automatically done by the spreadsheet file with minimal human interaction.

The emission reductions will be calculated with the following steps:

- i. Subtracting self consumption value from gross generation value for each month to find the net electricity supplied to the grid.
- ii. Adding up all monthly net electricity values to calculate the total net electricity supplied to the grid during the monitoring period.
- iii. Multiplying the total net electricity value with the CM emission factor.

The formulae that will be used for monitoring are as the following:

$EG_{facility,y,m} = EG_{facility,gross,y,m} - EG_{facility,net,y,m}$	[8]
$ER_y = \sum_{y,m} EG_{facility,y,m}$	[9]

Table 25. Explanations of parameters used for calculations

Parameter	Explanation
$EG_{facility,y,m}$	Quantity of net electricity supplied to grid by the Project plant in year y and month m (kWh)
$EG_{facility,gross,y,m}$	Quantity of gross electricity supplied to grid (power export) by the Project plant in year y and month m (kWh). In the PMUM reports in Turkish, this corresponds to “ISVM”.
$EG_{facility,net,y,m}$	Quantity of electricity consumed from grid (power import) by the Project plant in year y and month m (kWh). In the PMUM reports in Turkish, this corresponds to “UECM”.
ER_y	Emission reductions in year y (tCO ₂)
y	Year of monitoring period
m	Month of monitoring period

QA / QC:

The Project has to comply with the “Communiqué for Metering Devices to be used in the Electricity Market”, and has to install IEC-EN 60687 0.5 class measurement instruments that have a minimum accuracy of 0.5%¹⁵, which satisfies UNFCCC requirements. Therefore the data measurement is of high quality.

Both measurement devices are bidirectional meters and can measure the electricity input and output of the proposed Project simultaneously. The monitored data will be based on the primary measurement device, where the secondary measurement device will be used to ensure data quality by cross checking both readings. The secondary measurement device can be used for monitoring in case there is a problem with the primary device (in such a case another primary or secondary measurement device would be installed by TEIAS). Both primary and secondary measurement devices are sealed by TEIAS and cannot be accessed by any Project personnel. There is no need to open the seals for verification purposes, as the measurement devices and the seal permit the Project owner to (only) read the measurement data.

The primary source of data is the PMUM web site¹⁶, which is the basis for financial settlement and invoicing. The Project owner has an access code for its own projects to the PMUM web site and can call, report and print actual and historical electricity generation and consumption data of the Project activity. These PMUM reports can only be obtained by the Project owner, therefore screenshots will also be provided during verification for QA/QC reasons.

In case there is any unforeseen problem with the PMUM data, the secondary source of data are the invoices.

If any other unforeseen problem occurs, the electricity generation and consumption data used for invoicing or settlement with TEIAS will be valid.

Frequency of Monitoring and Reporting:

The measurement devices measure and record data continuously and these readings can be monitored

¹⁵ Source: EMRA web site (<http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44>)

¹⁶ Source: <http://dgpys.teias.gov.tr>

online by the Project owner's SCADA system. These data will be collected and reported once a month by TEIAS. The monitoring of emission reductions will also be carried out on a monthly basis, parallel to electricity generation reporting. Therefore, the frequency of monitoring is continuous and the frequency of reporting is monthly. The collected data will also be kept by the Project owner during and at least two years after the credit period.

Roles and Responsibilities:

The carbon manager of the Project owner is responsible for the preparation of the monitoring report. The Project owner is responsible for assigning a carbon manager, whose tasks include:

- Collecting and archiving monthly PMUM reports and screenshots electronically and as hardcopy,
- Collecting and archiving monthly invoices electronically and as hardcopy,
- Reporting in written form and collecting documentary evidence about any unusual issue regarding invoices, PMUM web site access, settlements, technical problems that might affect data quality and availability, significant equipment repair or maintenance and calibration, failure or replacement of measurement devices.
- Ensuring that information flow about the issues mentioned above between the Project manager on site and the carbon manager runs continuously during the whole monitoring period.
- Prepare the monitoring report, or provide the collected data to a 3rd party that is responsible for supporting the verification of emission reductions.

Non-Conformities:

Before installation, metering devices are technically checked, calibrated and certified by independent companies for their accuracy. Afterwards, TEIAS also tests both metering devices in order to ensure that the devices satisfy all requirements and are calibrated properly. In case of failure of the electricity meters or if any difference occurs between primary and secondary device TEIAS has to be informed by the Project owner for necessary maintenance and calibration. An agreement between the project participant and TEIAS will ensure that in case of problems or failures of the meters TEIAS will react as fast as possible to solve the problem and perform necessary maintenance and calibration. Since the Project owner will invoice TEIAS for the electricity it sells to the grid, the data is of high quality. If it is determined by TEIAS that the seal of the primary metering device is torn apart or any intervention is made; correct power amounts are determined over the secondary meter, beginning from the latest measurement when the recorded values of the primary and the secondary metering devices match. If any difference is seen by the Project owner between primary and secondary devices, TEIAS will be informed accordingly.

Calibration of measurement devices is the responsibility of TEIAS and it is managed by the same authority, without Project owner's control according to the current legislation. If the responsibilities and legal requirements about calibration would change, the Project owner will act accordingly.

Since monitoring of the electricity generation and consumption is in the responsibility of TEIAS, the Project owner has little control over how, where and when TEIAS makes the readings. In case the electricity data cannot or does not get recorded by TEIAS on site, but rather on the nearest transformer station for any unknown reason, PMUM electricity data (as on the PMUM web site) will be valid.

The Project owner will each month cross check the internal SCADA data with the PMUM data for quality control purposes. Usually the information in both sources should be in agreement. However, should the



data from both sources indicate a mismatch for any reason, then the Project owner may apply to TEIAS for correction of data and financial settlement. These cases will be reported in the monitoring report and if any settlement takes place the final figures will be used for calculations and documentary evidence will be provided to the verifying DOE.

Other non-conformities regarding readings, calibration and other TEIAS or PMUM system related issues are subject to the bilateral communication and settlements between TEIAS and the Project owner. In such a case, the results of these settlements will be used as the valid data source.

**Appendix 6: Summary of post registration changes**

N/A

History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03	EB 25, Annex 15 26 July 2006	
02	EB 14, Annex 06b 14 June 2004	
01	EB 05, Paragraph 12 03 August 2002	Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Registration		