CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Title : Kayaduzu Wind Power Plant, Turkey

Document Version Nr. : 11
Date of Completion : 16/04/2013

A.2. Description of the project activity:

The project of **Merzifon Enerji A.S** (hereafter referred to as "**Merzifon"**), Kayaduzu Project (hereafter referred to as the "Project" or **"Kayaduzu WPP"**), involves installation and operation of 16 turbines with rated power output of 2.5 MW each to best suit the local conditions of the project area. The generation of total capacity of 40 MW will be connected to a switchyard, where the voltage will be steeped up to high voltage with 0.69/34.5kV, 1600kVA transformers connected to each unit. The 16 turbines in the park will be connected as a single group to the Wind Power Plant Control Building Switching Center via underground cables. The energy generated by the power plant in the project area will be transferred to the National Electricity System (TEİAŞ) via the 33kVA busbar of the Kayaduzu Transformer Station by a 2x477 MCM, 33 kVA and 1 km power transmission line.

Merzifon has granted generation license as IPP for 39 MWe wind power plant by Energy Market Regulatory Authority (EMRA) and this licence was issued in June 2004. As project license has 39 MW, one of turbines with 2.5 MW will be capped by 1.5 MW electrical power. With this total installed capacity will be 40 MWm and 39 MWe as stated in licence.

An **estimated generation of 111,670 MWh per year** by the efficient utilization of the available wind energy by project activity will replace the grid electricity, which is constituted of different fuel sources, mainly fossil fuels. In case no wind power plant is built, the 111,670 MWh generated electricity would be provided by conventional power plants fed with fossil fuels. The electricity produced by project activity will result in an **annual emission reduction of 66,777 tonnes of CO_2e**. Moreover, project activity will contribute further dissemination of wind energy and extension of national power generation. Construction has started November 2010 and is expected that generation of electricity will start as of June 2011 and will have an operational life of 20 years.

Prior to the start or project, the land, where the project site is, has been used for grazing purposes. After construction stage has been finished, the land will be further used for grazing purposes.

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

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

- reduce other pollutants resulting from power generation industry in Turkey, compared to a business-as-usual scenario;
- help to reduce Turkeys increasing energy deficit;
- and differentiate the electricity generation mix and reduce import dependency.

As the project developer, Merzifon believes that efficient utilization of all kinds of natural resources with a harmony coupled with responsible environmental considerations is vital for sustainable development of Turkey and the World. This has been a guiding factor for the shareholders towards the concept of designation and installation of a wind power project. Other than the objective of climate change mitigation through significant reduction in greenhouse gas (GHG) emissions, the project has been carried out to provide social and economical contribution to the region in a sustainable way. The benefits that will be gained by the realization of the project compared to the business-as-usual scenario can be summarized under four main indicators:

Environmental
The project activities will replace the grid electricity, which is constituted of different fuel sources causing greenhouse gas emissions. By replacing in the consumption of these fuels, it contributes to conservation of water, soil, flora and faunas and transfers these natural resources and also the additional supply of these primary energy sources to the future generations. In the absence of the project activity, an equivalent amount of electricity would have been generated from the power plants connected to the grid, majority of which are based on fossil fuels. Thus, the project is replacing the greenhouse gas emissions (CO_2, CH_4) and other pollutants (SO_X, NO_X, particulate matters) occurring from extraction, processing, transportation and burning of fossil-fuels for power generation connected to the national grid.

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

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

Technological
As the project developer is a Turkish company using the returns from the GS VER project to enable the realization of the wind power plant, the Turkish capabilities, competencies and self-reliance regarding the introduction of innovative technologies are strengthened. The project developer considers the investment and the operation of a new technology in Turkey as a contribution to technological self reliance due to the gathered experience with the proposed project. Implementation of the proposed project will contribute to wider deployment of wind power technology in local and national level. It will demonstrate the viability of larger grid connected wind farms, which will support improved energy security, alternative sustainable

energy, and also renewable energy industry development. Furthermore, some of the employees will be trained for wind power plant related issues. All those factors will also strengthen pillars of Turkish electricity supply based on ecologically sound technology. However, since it is difficult to substantiate and monitor that these trainings will lead an important know-how and technology transfer, this indicator is scored with (0) in the SDM, to be conservative. Since this indicator is scored zero and no mitigation measure is required chosen parameter, i.e. total number of employee having operation and maintenance certificates will not be monitored in the Passport. For more detail information please see Passport document.

A.3. Project participants:

The project participant is listed in the table below, and the contact information of the project participant is provided in Annex 1.

Table 1: Parties involved

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as Project Participant (Yes/No)
Turkey (host)	**Merzifon Enerji A.S.** (private entity)	No

Merzifon Enerji A.S. is the developer and owner of the Project.

The Republic of Turkey is the host country. Turkey has recently ratified the Kyoto Protocol (on 5th February of 2009). Turkish National Focal Point to the UNFCCC is the Ministry of Environment and Forestry[1].

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

The host country is Republic of Turkey.

A.4.1.2. Region/State/Province etc.:

Project area is 37 km north-west to the province Amasya, in the Black Sea region of Turkey.

A.4.1.3. City/Town/Community etc.:

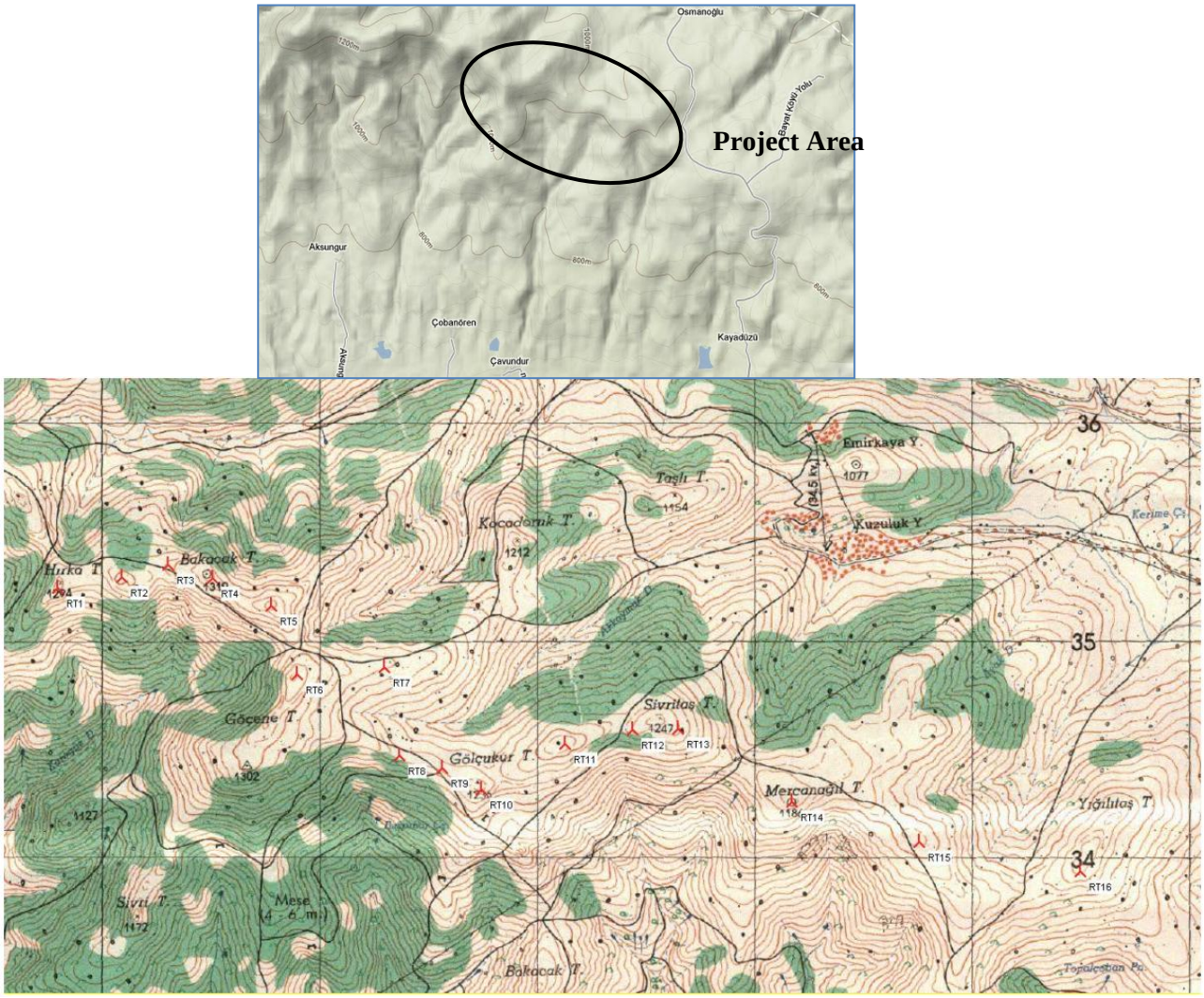
The project is in the province Amasya, 8 km north-east to the town of Merzifon.

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

[1] UNFCCC, list of the National Focal Points http://maindb.unfccc.int/public/nfp.pl?mode=wim

Location of the project is given below in the Map 1 with micrositing of the turbine and distance to the closest locations.

The Kayaduzu wind farm project is planned on a mountain ridge. The region is characterized by mountains (complex terrain) with significant differences in height. The site is located on bare hills with poor vegetation like grass and bush land. The area is partly surrounded by transitional woodland and shrub. To the west and south of the site a large broad-leaved forest area is found.



Map 1: Project area with turbine micrositing

Table 2: Geographical coordinates of the wind turbines of the project activity

Wind Turbine No.	Latitude (N)	Longitude (E)	Wind Turbine No.	Latitude (N)	Longitude (E)
1	40° 56' 28"	35° 30' 14"	**9**	40° 55' 59"	35° 31' 29"
2	40° 56' 29"	35° 30' 27 "	**10**	40° 55' 56"	35° 31' 37"
3	40° 56' 31 "	35° 30' 37"	**11**	40° 56' 2"	35° 31' 54"

4	40° 56' 28 "	35° 30' 45 "	**12**	40° 56' 5"	35° 32' 7"
5	40° 56' 24"	35° 30' 56"	**13**	40° 56' 5"	35° 32' 16"
6	40° 56' 14"	35° 31' 1"	**14**	40° 55' 53"	35° 32' 37"
7	40° 56' 15"	35° 31' 18"	**15**	40° 55' 46"	35° 33' 2 "
8	40° 56' 2"	35° 31' 21 "	**16**	40° 55' 41"	35° 33' 34"

A.4.2. Category(ies) of project activity:

Using the list of categories of project activities and of registered CDM project activities by category available on the UNFCCC CDM web site[2], Kayaduzu WPP falls in:

Scope number: 1
Sectoral scope : Energy industries, renewable sources.

A.4.3. Technology to be employed by the project activity:

According to the wind farm energy yield assessment report of the site, 16 wind turbines with unit capacity of 2,500 kW were selected for the project. Nordex is decided as equipment provider due to the outstanding features of its product regarding safety factors, simple durable design for low maintenance and long life operation, high efficiency, and also for fine visual appearance. The key parameters about the technical design of the selected model N100/2500 HS of Nordex turbines is listed below in Table 3.

Table 3: Technical specifications of Nordex N100/2500 HS model turbines

Specifications	**Nordex N100[3]**
Rated Power (kW)	2,500
Rotor Diameter (m)	100
Hub Height (m)	80
Num. of Blades	3
Cut in/cut out wind speed (m/)	4.0 – 20.0 m/s
Wind Speed at rated power(m/s)	14.0-20.0
Generator type	Double-fed asynchronous
Rotor Blade Material	Glass fibre-reinforced polyester, integrated lightening protection
Lifetime	20 years

Lifetime of turbines is taken from datasheet (brochure) of turbine provider (Nordex) for N100/2500 types[4].

The project activity will achieve emission reductions by avoiding CO_2 emissions from the business-as-usual scenario electricity generation. The business-as-usual scenario and the scenario existing prior this wind farm electricity would be produced by mainly fossil fuel-fired power plants within the Turkish national grid (Figure 2) Total emission reduction over the 7 year crediting period is expected to reach **467,439 tCO_2e** with the assumed total net electricity generation of **111,670 MWh per year** (for details see B.2.).The

[2] For List of Sectoral Scopes see: http://cdm.unfccc.int/DOE/scopelst.pdf, page 1

[3] See, http://www.nordex-online.com/fileadmin/MEDIA/Gamma/Nordex_Gamma_N100_USA.pdf

[4] See, http://www.nordex-online.com/fileadmin/MEDIA/Gamma/Nordex_Gamma_en.pdf (page 4, paragraph 2)

specific goals of the project are to reduce GHG and other emissions, help stimulate the growth of wind power industry, create local employment, as well as differentiate the electricity generation mix. For further detail please see Section A.2.

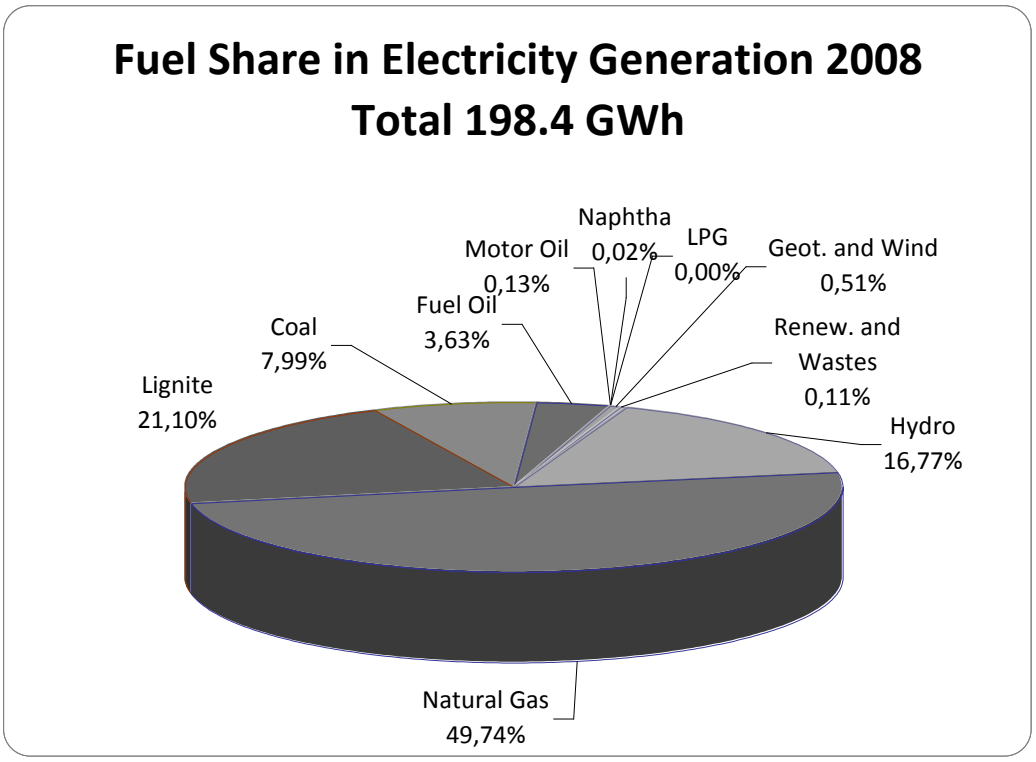


Figure 1: Share of Installed Capacity by Fuel Types in Turkey in 2008[5]

[5] See, TEİAŞ, Annual Development of Turkey's Installed Capacity by Primary Energy Resources (1984-2008), http://www.teias.gov.tr/istatistik2008/32(75-08).xls (Multi fuel fired PPs are grouped in liquid fuel fired plants for the sake of simplicity)

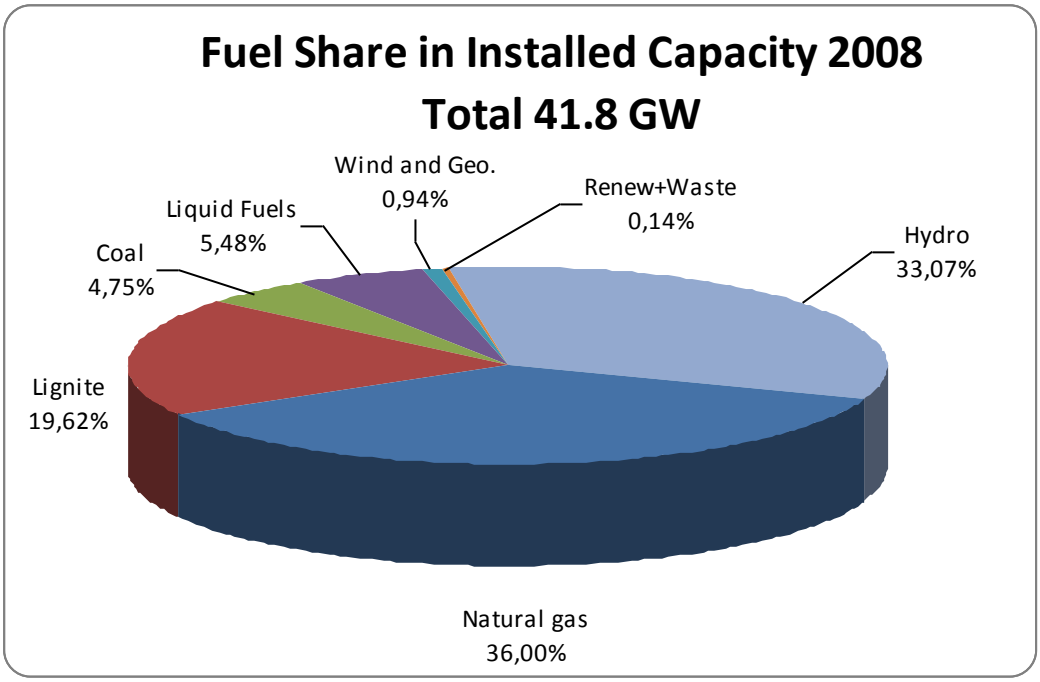


Figure 2: Share of Electricity Generation by Fuel Types in Turkey in 2008[6]

Although Turkey has a very good wind resource, substantial space, a reasonably good electrical infrastructure and an approaching shortage of electricity; it uses small share of (less than 3%) its onshore potential, which is estimated as 48,000 MW by Ministry of Energy and Natural Resources (MENR)[7]. Lack of attractive incentives and tax advantages, limited grid access and restricted turbine supply constitutes the major barriers in front of the wind energy.

Renewable energy law, enacted in 2005, which had amendments in 2007 regarding feed-in tariffs, stipulates a purchase obligation by the retail companies for 10 years with a purchase price between 5 and 5.5 €/kWh. This tariff is much below the average remuneration in the leading wind markets and does not constitute a sufficient incentive for investments in little experienced wind energy sector of Turkey. The revenues calculated according to these regulations are considered in the investment planning of the projects and do not lead to returns that let the project be profitable or attractive for capital investors and lenders.

These numbers and figures show the contribution of a wind power project like Kayaduzu WPP to the development of environmental friendly electricity generation instead of above described Turkish mix of hydroelectric and fossil fuelled power plants, which are better known and financially more attractive from an investor's point of view. The emission reductions would not occur in the absence of the proposed project activity because of various real and perceived risks that impede the provision of financing.

Kayaduzu WPP, as a large wind power plant project, will serve as a perfect project to demonstrate long-term potential of wind energy as a means to efficiently reducing GHG emissions as well as to diversifying and increasing security of the local energy supply and contributing to a sustainable development. Wind driven turbines will rotate in generators and electricity generated here will be transferred to the grid for consumer without any greenhouse gas emissions. The Gold Standard certification shall help to realize this seminal

[6] See, TEİAŞ, Annual Development of Turkey's Gross Electricity Generation of Primary Energy Resources (1940-2008), http://www.teias.gov.tr/istatistik2008/3.xls

[7] See, ETKB, Mavi Kitap (Blue Book): http://www.enerji.gov.tr/yayinlar_raporlar/Mavi_Kitap_2009.pdf , page page 8

technology by providing an adequate compensation for the lacking financial incentives in the Turkish renewable energy market.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Generation of emission reduction and by the way crediting period will start with the first day of documented electricity supply to the national grid. The first 7-year crediting period is expected to be from 17 March 2012 to 16 March 2019 after the completion of commissioning. Applying the approved methodology to the project (detailed in the Section B) annual average amount of **66,777** tCO_2e emission reductions is estimated to be achieved by producing **111,670 MWh/year** electricity. In each year the amount of VERs actually generated by the project will vary depending on the metered net electricity supplied to the grid, but totally **467,439** tCO_2e emission reductions is expected over the period of 7 years and distribution of minimum quantity to years is listed in Table 4.

Table 4: Estimated annual emission reductions of the project over the crediting period.

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
2012*	52,865
2013	66,777
2014	66,777
2015	66,777
2016	66,777
2017	66,777
2018	66,777
2019**	13,912
Total estimated reductions (tonnes of CO_2e)	**467,439**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**66,777**

* 9.5 months operation in 2012
** 2.5 months operation in 2019

A.4.5. Public funding of the project activity:

The project activity doesn't have any public funding or Official Development Assistance (ODA) funding.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

For the determination of the baseline, the official methodology ACM0002 version 12, EB 56, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"[8], is applied, using conservative options and data as presented in the following section. This methodology refers to four Tools, which are:

1. Tool to calculate the emission factor for an electricity system. Version 02 has been applied for the project at hand. .
2. Tool for the demonstration and assessment of additionality. Version 05.2 has been applied for the project at hand.
3. Combined tool to identify the baseline scenario and demonstrate additionality. Version 02.2 has been applied for the project at hand.
4. Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion. Version 02 has been applied for the project at hand.

For baseline calculation the first tool, Version 02, for additionality assessment the second tool is used. As third tool, Version 02.2, is the combination of the first and second tool, it is not used. Since no project emission or leakage calculation is required for wind power project fourth tool, Version 02, is not used, either.

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

The choice of methodology ACM0002 version 12, is justified as the proposed project activity meets its applicability criteria:

"(a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s). "

Kayaduzu WPP is a grid-connected renewable power generation project activity that is a new wind power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant). Furthermore, the project does not involve switching from fossil fuels to renewable energy at the site of the project activity.

"The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;"

The project at hand is wind power plant and therefore fulfils this applicability criteria.

[8] ACM0002 Version 12: (http://cdm.unfccc.int/UserManagement/FileStorage/NAIRO8FDLZHKM42TYQGJS91WVBE36X)

"In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 11 to calculate the parameter EGPJ,y): the existing plant 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 or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;"

In the project at hand there are no capacity additions or replacements. Furthermore, the project is not retrofit and therefore this criterion is not applicable for the project at hand.

B.3. Description of the sources and gases included in the project boundary:

The project uses wind energy to produce electricity. Kinetic power of the wind is converted to electrical energy, which then will be transferred to the grid. Back-up power generators in the wind farm will only be used when the wind farm is out of service and power cannot be supplied from grid. Hence, emissions due to usage of back-up power generation are expected to be very low and are taken to be zero complying with the ACM0002 version 12, EB 56, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"[9].

A general operation diagram of the project is given in Figure 3.

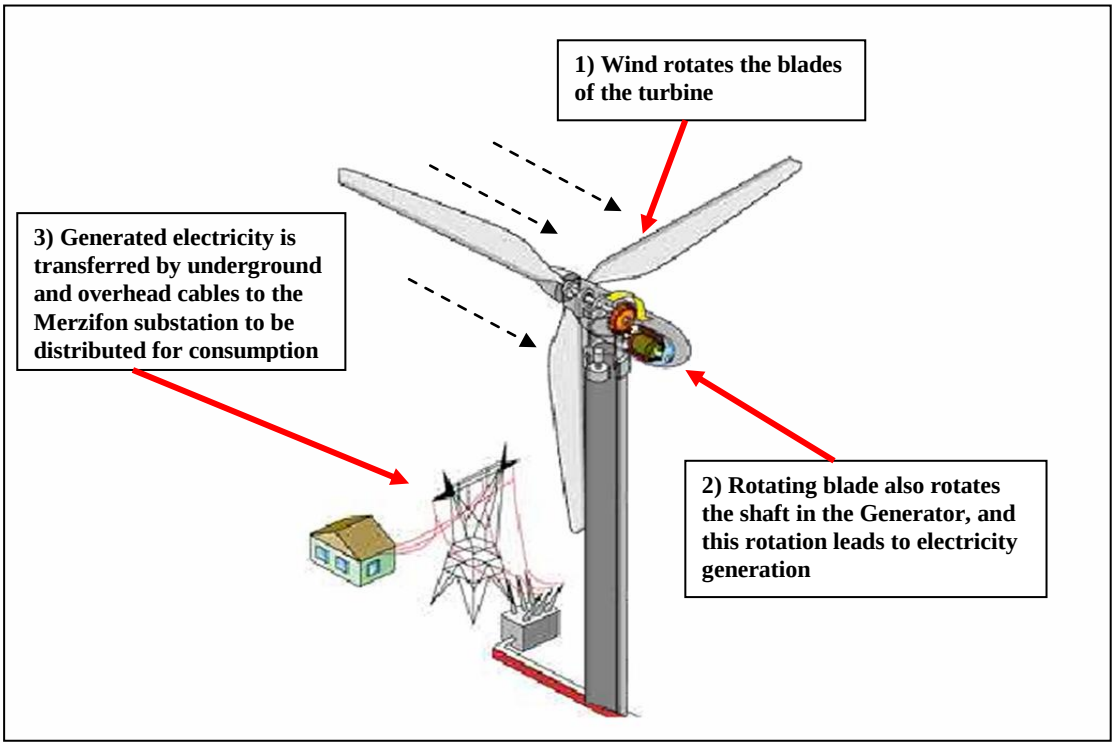


Figure 3: Operation diagram of the project

[9] ACM0002 Version 12: (http://cdm.unfccc.int/UserManagement/FileStorage/NAIRO8FDLZHKM42TYQGJS91WVBE36X)

According to the methodology 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.

Based on the above operation diagram, the baseline and project activity related greenhouse gases which are considered in baseline calculation and project boundary is given below, in Table 5:

Table 5: Emissions sources included in or excluded from the project boundary

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	*Main emission source*: Fossil fuels fired for electricity generation cause CO_2 emissions. It is included to baseline calculation to find the displaced amount by the project activity.
		CH_4	No	*Minor emission sources*: Even though there may be some CH_4 and N_2O emissions during electricity generation, these emissions are negligible and not included in baseline calculation to be conservative and comply with Table-1 of the methodology (page 5).
		N_2O	No	
Project Activity	Emissions during construction and operation of the project activity	CO_2	No	*Minor emission source*
		CH_4	No	*Minor emission source*
		N_2O	No	*Minor emission source*

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The baseline scenario is identified according to the "Baseline Methodology Procedure" of ACM0002 ver.12 (page 4). The project activity is installation of a new grid-connected wind farm with 16 turbines and is not modification/retrofit of an existing grid-connected power plant. So, first identification of this procedure is selected for proposed project activity, which is described as:

> *"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".*

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

Demand for electricity in Turkey is growing rapidly with average 5.72%[10] for previous ten years. TEİAŞ, who is responsible from the grid reliability has prepared an electricity demand projection for next ten years period (2009-2018) for Turkey and announced on June 2009, given in Table 6 and Figure 4, reflecting the continuation of current demand growth[11].

[10] See, http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf (page 4, Table 1)

[11] See Link in Footnote-7 (page 12-13, Table 4 for High and Table 5 for Low Scenarios)

Table 6: Low and High Demand Projection Scenarios for Ten Years Period (TWh)

Scenarios	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Low Scenario	194.0	202.7	213.9	228.2	243.5	259.8	277.2	295.5	315.0	335.8
High Scenario	194.0	202.7	215.9	232.1	249.5	268.2	288.4	309.7	332.6	357.2

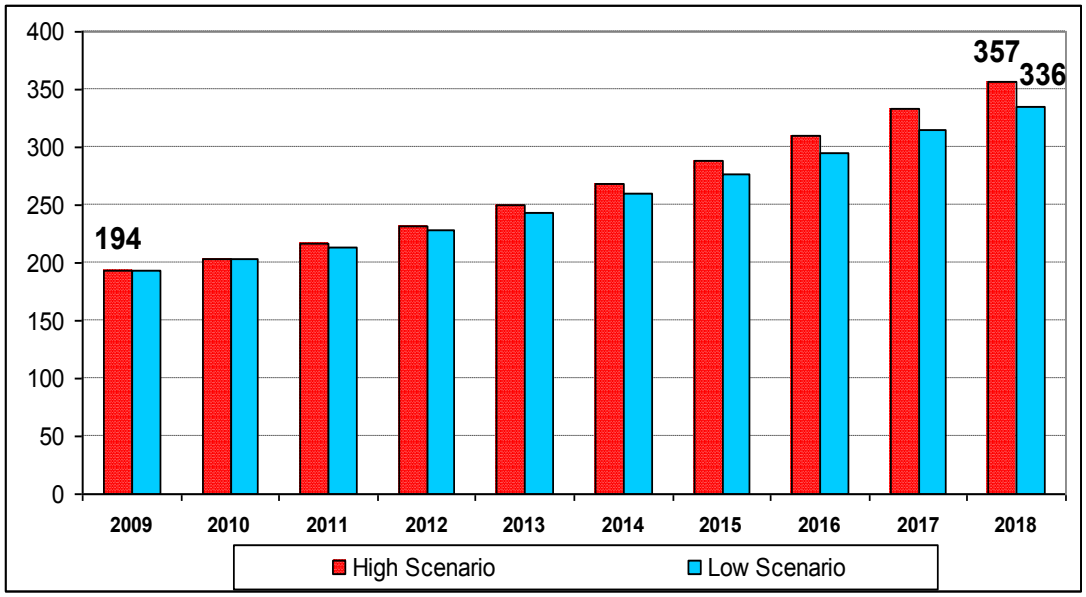


Figure 4: Electricity Demand Projections for Ten Years

In this projection, electricity supplies are also forecasted taking into account all power plants, which are operational, under construction and newly licensed. Generation projection based on project generation is given in :

Table 7: Projection of Total Generation Capacity by Fuel Types (TWh)[12]

YEARS	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	SHARE IN 2018 (%)
LIGNITE	52.6	52.4	52.5	52.5	52.6	52.5	52.4	52.5	52.5	52.6	*16.7%*
HARDCOAL	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	*1.0%*
IMPORTED COAL	12.1	12.7	14.4	19.9	28.2	31.7	32.0	32.6	32.2	32.3	*10.2%*
NATURAL GAS	110.3	111.9	114.6	125.9	139.0	137.9	138.6	139.2	138.4	134.5	*42.7%*
GEOTHERMAL	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	*0.2%*
FUEL OIL	13.8	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	*3.9%*
DIESEL	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	*0.4%*
OTHER	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	*0.5%*
THERMAL TOTAL	195.4	196.0	200.4	217.3	238.8	241.1	242.0	243.3	242.1	238.3	*75.7%*
BIOGAS+WASTE	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	*0.1%*
HYDRO	49.7	54.8	59.7	65.9	68.8	68.7	68.7	72.6	72.6	72.6	*23.0%*
WIND	1.6	2.4	3.2	3.7	3.7	3.7	3.7	3.7	3.7	3.7	*1.2%*
TOTAL	**246.9**	**253.5**	**263.6**	**287.3**	**311.6**	**313.9**	**314.8**	**320.0**	**318.8**	**315.0**	***100.0%***

[12] See, http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf (page 32, Table 22)

It is clear from above table that at least for 9 years fossil fuels will be the main resource for electricity generation with 75.5% (Total Thermal – Geothermal) share in 2018. Natural Gas will continue to hold the dominance and total imported fuel will still constitutes significant share with 52.9%. However, non-hydro renewables constitutes only 1.5% (Geothermal+Biogas+Waste+Wind); hydro included renewables constitutes 24.5% of energy mix in 2018. This projection is consistent with continuing fossil fuel dependent characteristics of Turkish electricity sector, which is given in Figure 5. Fossil fuels are generally takes higher shares of Turkish electricity generation from 1970s and there is a clear increasing trend since the beginning of 1990s, which comes to 82.6% as the year of 2008.

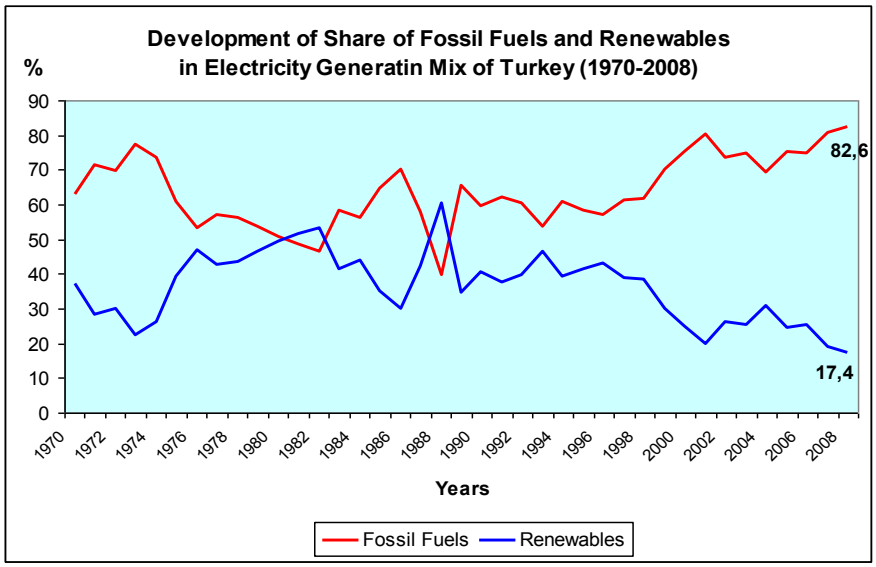


Figure 5: Development of Fossil Fuels and Renewables Shares in Turkish Electricity Mix (1970-2008)[13]

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

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

- **Conclusion-2:** Even all operational plants, construction phase plants and licensed ones are taken into account lack of supply is projected after the year of 2014[14]. So, there is significant need for electricity generation investments to satisfy demand, which means electricity to be generated by the project activity would otherwise be generated by new power plants to avoid power shortage in coming years.

- **Conclusion-3:** Fossil fuels will hold the dominance in generation mix for at least midterm period (till the end of 2018) with 75% share. Hydro included renewables will remain low with 24.5% share and non-hydro energy contribution will stay negligible with only 1.5% of total share by the end of that period. This also shows that most of new capacity additions will be fossil fuel fired power plants.

[13] See TEİAŞ, http://www.teias.gov.tr/istatistik2008/33.xls (Renewable generation is composing of 'renewable and waste', 'hydro' and 'geothermal and wind' data)

[14] See, http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf (page 78, Table 44)

CM calculations for baseline scenario are given in B.6 section of this document.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

For the explanation of how and why the project activity leads to emission reductions that are additional to what would have occurred in the absence of the project activity, the Gold Standard Toolkit (page 35, Table 2.3) refers to the "Tool for the demonstration and assessment of additionality version 05.2 " (Tool) [15], which

This tool defines a step-wise approach to be applied to the proposed project.to demonstrate and assess additionality. These Steps include:

> *"Step 1: Identification of alternatives to the project activity;*
> *Step 2: Investment analysis to determine that the proposed project activity is either:*
> *1) not the most economically or financially attractive, or*
> *2) not economically or financially feasible;*
> ***OR** Step 3: Barriers analysis;*
> *Step 4: Common practice analysis."*

Those steps are strictly followed in the project at hand in order to show the additionality.

> *"This tool does not replace the need for the baseline methodology to identify the baseline scenario. Project participants that propose new baseline methodologies shall ensure consistency between the determination of additionality of a project activity and the determination of a baseline scenario."*

For the determination of the baseline, the official methodology ACM0002 version 12, EB 56, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" has been used for the project at hand.

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

Sub-step 1a. Alternatives to the project activity

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

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

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

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

[15] See, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf (page 4)

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

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

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

According to baseline scenario, which is described in B.4, there is a need for energy investment to satisfy increasing demand and if the Kayaduzu WPP is not built, the same amount of energy will be supplied by other private investors to the grid. Forecasts shows that electricity supplied in the absence of Kayaduzu WPP will be mainly based on fossil fuels as the projections for the year of 2018 forecasts 75% share for fossil fuels in the energy mix.

Sub-Step 1.a Conclusions:
Based on the above provided information, two realistic and credible alternative scenarios are identified for the project activity:

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

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

Both alternatives are (building or not building the project activity) in compliance with the following identified applicable mandatory laws and regulations. This is also proven by the authorizations and operation permits obtained. :

(1) Electricity Market Law [16] (Nr. 4628 / 03.03.2001)
(2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[17] (Nr. 5346 / 10.05.2005)
(3) Environment Law[18] (Nr. 2872 / 16.12.2003)
(4) Energy Efficiency Law[19] (Nr. 5627/ 18.04.2007)
(5) Forest Law[20] (Nr. 6831, 31.08.1956)
(6) Occupational Health and Safety Regulation[21] (09.12.2003)

The renewable Energy generation license for Kayaduzu WPP has been issued considering Electricity Law and Law in utilization of Renewable Energy Resources for the purpose of generating electricity energy. The

[16] See: http://www.epdk.gov.tr/mevzuat/kanun/elektrik/elektrik_piyasalari_kanunu.pdf
[17] See: http://www.epdk.gov.tr/mevzuat/diger/yenilenebilir/yenilenebilir.doc
[18] See: http://www2.cevreorman.gov.tr/yasa/k/2872.doc
[19] See: http://www.eie.gov.tr/duyurular/EV/EV_kanunu/EnVerKanunu_Temmuz2008.pdf
[20] See: http://www.mevzuat.adalet.gov.tr/html/1003.html
[21] See: http://www.alomaliye.com/issagligi_guvenligi_yonetmeligi.htm

proposed project is also within the scope of and in compliance with Energy Efficiency Law (Article 2 of Part One). Environment Law is also satisfied in terms of sustainable development principles and EIA conducted for the proposed project activity. Finally, Forest Law, which specifies that forest areas can be allocated by Ministry of Environment and Forestry to institutions or individuals for energy plants if the project implementation serves common good for public.

Table 8: Planned Project Implementation Schedule and Early Consideration of VER

Date (DD/MM/YYYY)	Activity
24/07/2008	Issuance of the Licence
01/06/2009	Decision of Board for carbon finance (Early consideration)
29/03/2010	Request for consultancy by Merzifon to FutureCamp Turkey
22/07/2010	Signature with FutureCamp Türkiye for VER Development
27/08/2010	Informing Gold Standard with project activity (Invitation to LSC Meeting)
21/09/2010	Holding of LSC Meeting
06/10/2010	Electromechanical Contract (Project Start and Investment Decision Date)
27/10/2010	Financing Closure
09/10/2010	Start construction of the roads
17/03/2012	Commercial operation start date for the project activity

According to Turkish regulations, to get necessary permits for further project implementation, license issued by EMRA is required. Hence, issuance of license cannot be considered as 'Project Start Date' but a prerequisite to proceed for further project development activities. Date of electromechanical equipment contract date (06/10/2010) is set to be project starting and investment decision date. Board of Merzifon dated 01/06/2009 clearly shows that revenue from carbon reduction certificates was a decisive factor for the company to give investment decision for the project activity. From above Implementation Schedule it can be seen that Merzifon has just after having license started to analysis of VER and decided to get consultancy for VER development, much before planned construction starting date.

Aforementioned project implementation schedule shows us that Merzifon started to consideration of VER before project start date by contracting CDM consultant on 22/07/2010 and submitting project information to Gold Standard on 27/08/2010, which demonstrates that VER Revenue has decisive impact on decision of proceeding to the project.

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

Sub-Step 1.b Conclusions:

Based on the above provided information, it can be stated that both alternatives are (building or not building the project activity) in compliance with the following identified applicable mandatory laws and regulations. This is also proven by the authorizations and operation permits obtained.

Step 2. Investment analysis

Sub-step 2a: Appropriate analysis method

With the help of the investment analysis it shall be demonstrated that the proposed project activity is not economically or financially feasible without the revenue from the sale of VERs. Therefore, the benchmark

analysis shall be applied, as there is no alternative project activity for a comparison of the attractiveness of an investment.

Sub-step 2b: Option III: Benchmark analysis

As a common means to evaluate the attractiveness of investment projects and compare them with possible alternatives, the IRR (Internal Rate of Return) shall be used.

According to the Tool, benchmark can be derived from '*Estimates of the cost of financing and* ***required return on capital*** *(e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned),* ***based on bankers views*** *and private equity investors/funds*'. As a banker view, according to Worldbank loan appraisal document[22], threshold equity IRR for wind power investments (i.e. required returns of equity for wind power investors) in Turkey is 15%.

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

In the 11th paragraph of the 'Guidance on the Assessment of Investment Analysis'[23], it is stated that: 'Required/expected returns on equity are appropriate benchmarks for equity IRR'. Since, benchmark identified in the Sub-step 2b *is required/expected returns on equity*, equity IRR (after tax) of the project activity shall be calculated for comparison.

Parameters used for investment analysis of the project activity are given below[24]:

Table 9 Parameters used in Financial Analysis of Project Activity

Parameter	Amount	Unit	Reference
Installed Power	40	MW	Licence issued by Energy Market Regulatory Authority (EMRA)
Annual Generation	111,670	MWh	Energy Assessment Report by Lahmayer dated 20.10.2010.
Investment Cost	40,341,288	EUR	a) Electro Mechanical Purhase Agreement with Nordex dated 06.10.2010. b) Proposal of Güngör Elektrik for Electrical works dated 27.09.2010 c) Proposal of Sena İnşaat dated 18.10.2010. d) Calculation, For licencing, Development and Operation Cost During Construction
Operation Cost	1,417,9344	EUR	a) Salaries for 5 staff and security service b) Supplier Agreement with Nordex c) System usage fee and fee to Forestry Directorate
Electricity Sale Price	55	EUR/MWh	Renewable Energy Law[25]

[22] Worldbank - Project Appraisal Document on a IBRD Loan and a Proposed Loan from Clean Technology Fund to TSKB and TKB with the Guarantee of Turkey, May 2009 (http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/05/11/000333037_20090511030724/Rendered/PDF/468080PAD0P112101Official0Use0Only1.pdf page 80, paragraph 29 and page 81, Table 11.5)

[23] See, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf (page 14)

[24] Supporting documents are available to DOE

[25] See: http://www.tbmm.gov.tr/develop/owa/kanunlar_sd.durumu?kanun_no=6094

Corporate Tax Rate	20	percent	Tax Regulation of Turkey[26]
Transmission Loss Factor	2.5	percent	TEIAS Statistics[27]
EUR/TL Exchange Rate	1.9596	N/A	CBRT Purchase Rate on Investment Decision Date (06/10/2010)[28]
Depreciation Periods: Turbines Electrical Equipments	 10 20	 yrs yrs	Tax Regulation of Turkey[29]

The after tax equity IRR of Kayaduzu WPP is calculated on the basis of expected cash flows (investment, operating costs and revenues from electricity sale), as used in the financial analysis for the feasibility assessment of the project. Finance lease was utilized for implementation of the project. The parameters and values used for the IRR calculation are available to DOE during validation. The resulting IRR for 20 years is stated in below table.

Table 10: Equity IRR value for project activity (after tax)

Period	IRR
20 years	9.52%

Benchmark does clearly exceed the resulting equity IRR, thus rendering the project activity economically unattractive.

Sub-step 2d: Sensitivity analysis

The most effective parameters for sensitivity analysis are electricity price, energy yield, and investment cost. For electricity price; According to 2010 Electricity Market Report of EMRA[1], average of prices in spot market is 120 TL/MWh (average of 122 TL/MWh for SGÖF and 118 TL/MWh for SMF). EUR/TL Exchange rate average for 2010 is 1.994[2] So EUR converted price which is 60.2 EUR/MWh in spot market for 2010 is not exceeding 10% more of feed-in-tariff which is 60.5 EUR/MWh. Thus 10% range is applied for electricity price in sensitivity analysis.

As investment cost used in investment analysis is from contracts which are fixed, costs cannot differ too much. Thus, 10% range is applied for the sensitivity analysis is considered to be appropriate.

For energy yield, already p75 figure stated in the energy yield report is used in investment analysis. p75 figure is the probability of having that annual energy yield amount is 75%. Thus a range 10% from this figure already covers the possibility of utmost energy yield expectation from the project activity and having more energy yield above this range is unlikely.

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[26] See: http://www.kpmgvergi.com/tr-tr/PratikBilgiler/vergimevzuatibilgileri/oranlar/Pages/KurumlarVergisiOrani.aspx

[27] See: http://www.teias.gov.tr/istatistik2008/30(84-08).xls (average of last 3 yrs)

[28] See: http://www.tcmb.gov.tr/yeni/eng/

[29] See: http://www.gib.gov.tr/fileadmin/user_upload/Yararli_Bilgiler/amortisman_oranlari2011.html

[1] ,(see; http://www2.epdk.org.tr/Belgeler/ElektrikPiyasasiRaporu2010.pdf , page xiv)

[2](See;http://www.hazine.gov.tr/irj/go/km/docs/documents/Treasury%20Web/Statistics/Economic%20Indicators/egostergе/VIIFiyatlar/fiyatlar.xls (sheet VII.5)).

Operating cost parameter is also are varied with +/- 10%. The worst, base and best-case results for each parameter variation are given below, in Table 11. The sensitivity analysis confirms that the proposed project activity is unlikely to be economically attractive without the revenues from VERs as even the maximum IRR result for the best case scenario (13.37%) is below the benchmark, which is 15%.

Table 11: Equity IRRs (after tax) according to different parameters (EP is 55 €/MWh)

Parameter	**Electricity Price**			**Investment Cost**			**Energy Yield**			**Operating Cost**		
Variance	**-10%**	**0%**	**10%**	**-10%**	**0%**	**10%**	**-10%**	**0%**	**10%**	**-10%**	**0%**	**10%**
IRRs	5.57%	9.52%	13.37%	13.05%	9.52%	6.56%	5.57%	9.52%	13.37%	10.44%	9.52%	8.60%

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

Electricity Price

In order to reach %15 equity IRR benchmark, electricity price 62.94 EUR/MWh which is 14.44% higher than assumed price (55 EUR/MWh). As explained above, even 10% increase from base case is not likely to occur. Thus it is not likely for project activity to sell electricity with benchmark threshold price.

Investment Cost

In order to reach benchmark IRR, investment costs shall be decreased more than 14.92% and be 34,322,367 EUR, comparing with investment costs used in financial analysis (40,341,288 EUR). However, even total of two contracted and fixed major items of investment costs (turbines and electrical equipments given in Table 12) are higher than the threshold cost. Thus it is not likely for project activity to have threshold investment cost and reach to benchmark IRR.

Energy Yield

To have benchmark IRR, annual energy yield amount shall increase to 127,817 MWh/yr, which is 14.46% more than base case electricity generation amount used in financial analysis. Although most of the wind power project uses p90 electricity generation amount from energy yield reports, to be conservative in financial investment analysis of the project activity p75 is used (111,670 MWh/yr). Even p50 figure of the project activity (119,976 MWh/yr[30]) is less than threshold energy yield amount. Using electricity generation amount in financial analysis, which have less than 50% probability of occurrence is not rational. Thus it is not likely for project activity to generate threshold energy yield to reach benchmark IRR.

Operation Cost

In order to reach benchmark IRR, annual operation decrease 61%. Such huge decrease in annual operation cost is not likely as even only contracted maintenance cost for project activity comprises 50% of the total annual operation cost.

Step 2 Conclusions:

Based on the above provided information, it can be stated the benchmark of 15% (World Bank Benchmark) does clearly exceed the resulting equity IRRs, thus rendering the project activity economically unattractive.

[30] Kayaduzu Energy Generation Report, dated 20.10.2010, page 54

Step 4: Common Practice Analysis

Sub-step 4a. Other activities similar to the proposed project activity

By the end of 2008, the latest year for which the official statistics are published by the time of PDD submission to DOE, breakdown of installed capacity of Turkey by Utilities and types are given in Table 13.

Table 13: Breakdown of Installed Capacity of Turkey by the end of 2008[31]

UTILITIES	TYPE	INSTALLED CAPACITY (MW)	TOTAL INSTALLED CAPACITY (MW)
EÜAŞ (State Power Generation Co.)	THERMAL	8,690.9	**20,146.8**
	HYDRO	11,455.9	
AFFILIATED PARTNERSHIP OF EÜAŞ	THERMAL	3,834.0	**3,834.0**
POWER PLANTS UNDER TRANSFER OF OPERATIONAL RIGHT (ToR) CONTRACT	THERMAL	620.0	**650.1**
	HYDRO	30.1	
MOBILE PLANTS	THERMAL	262.7	**262.7**
POWER PLANTS UNDER BUILT-OPERATE (BO) CONTRACT	THERMAL	6,101.8	**6,101.8**
POWER PLANTS UNDER BUILT-OPERATE-TRANSFER (BOT) CONTRACT	THERMAL	1.449.6	**2,449.0**
	WIND	17.4	
	HYDRO	982.0	
GENERATION COMPANIES (IPPs)	THERMAL	3,687.3	**4,839.6**
	WIND	345.1	
	HYDRO	*807.2*	
AUTOPRODUCERS	THERMAL	2,978.5	**3,533.2**
	WIND	1.2	
	HYDRO	553.5	
TOTAL INSTALLED CAPACITY	**THERMAL**	**27,624.9**	**41,817.2**
	WIND	**363.7**	
	HYDRO	**13,828.7**	

At the moment, 93 production licenses for wind power plants are issued by EPDK, the "Electricity Market Regulation Agency".[32] Work flow of the production projects are different in Turkey comparing with other countries. In many countries, the project developer should grant all other permits to be able to have a production license. In Turkey, to be able to take some permits like construction and building permits the project developer should have production license. So, even 93 licenses have been issued by EPDK, this doesn't mean that all these companies have taken investment decision and all these projects will be implemented. It is assessed that, the main intention of license applicants-owners is getting the right of building wind farm on proposed area to have a valuable asset, than they wait for appropriate incentive for wind energy or look for VER credits to get necessary finance to implement these projects.

[31] See, http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf (page 16, Table 9)

[32] See, EPDK, http://www.epdk.gov.tr/lisans/elektrik/yek/yeklisansgeneltablo.xls

There are 30 wind projects in operation as April 2011. These projects are given in below table.

Table 14: The wind projects in operation as April 2011[33]

NO.	Location	Company	Installed Cap. (MW)	Business Model of the Project	GS Project ID
1	İzmir-Çeşme	Alize Enerji Elektrik Üretim A.Ş.	1.50	IPP	-
2	Çanakkale-İntepe	Anemon Enerji Elektrik Üretim A.Ş.	30.40	IPP-VER	GS347
3	Manisa-Akhisar	Deniz Elektrik Üretim Ltd. Şti.	10.80	IPP-VER	(VER+)
4	Çanakkale-Gelibolu	Doğal Enerji Elektrik Üretim A.Ş.	14.90	IPP-VER	GS439
5	Manisa-Sayalar	Doğal Enerji Elektrik Üretim A.Ş.	30.60	IPP-VER	GS369
6	İstanbul-Çatalca	Ertürk Elektrik Üretim A.Ş.	60.00	IPP-VER	GS367
7	İzmir-Aliağa	İnnores Elektrik Üretim A.Ş.	42.50	IPP-VER	GS352
8	İstanbul-Gaziosmanpaşa	Lodos Elektrik Üretim A.Ş.	24.00	IPP-VER	GS503
9	İzmir-Çeşme	Mare Manastır Rüzgar Enerjisi Santralı San. ve Tic. A.Ş.	39.20	IPP-VER	GS368
10	İstanbul-Hadımköy	Sunjüt Sun'i Jüt San. ve Tic. A.Ş	1.20	IPP	-
11	İstanbul-Silivri	Teperes Elektrik Üretim A.Ş.	0.85	IPP	-
12	Balıkesir-Bandırma	Yapısan Elektrik Üretim A.Ş.	30.00	IPP-VER	(VER+)
13	Balıkesir-Şamlı	Baki Elektrik Üretim Ltd. Şti.	57.00	IPP-VER	GS351
14	Muğla-Datça	Dares Datça Rüzgar Enerji Santralı Sanayi ve Ticaret A.Ş.	17.00	IPP-VER	GS438
15	Hatay-Samandağ	Deniz Elektrik Üretim Ltd. Şti.	20.00	IPP-VER	(VER+)
16	Aydın-Didim	Ayen Enerji A.Ş.	31.50	IPP-VER	GS436
17	Çanakkale-Ezine	Alize Enerji Elektrik Üretim A.Ş.	20.80	IPP-VER	GS399
18	Balıkesir-Susurluk	Alize Enerji Elektrik Üretim A.Ş.	18.90	IPP-VER	GS437
19	Osmaniye-Bahçe	Rotor Elektrik Üretim A.Ş.	57.50	IPP-VER	GS474
20	İzmir-Bergama	Ütopya Elektrik Üretim Sanayi ve Ticaret A.Ş.	15.00	IPP-VER	GS672
21	İzmir-Çeşme	Mazı-3 Rüzgar Enerjisi Santrali Elektrik Üretim A.Ş.	22.50	IPP-VER	GS388
22	Balıkesir-Bandırma	Akenerji Elektrik Üretim A.Ş.	15.00	IPP-VER	GS634
23	Balıkesir-Bandırma	Borasco Enerji ve Kimya Sanayi ve Ticaret A.Ş.	45.00	IPP-VER	GS744
24	Manisa-Soma	Soma Enerji Elektrik Üretim A.Ş.	45.00	IPP-VER	GS655
25	Hatay-Belen	Belen Elektrik Üretim A.Ş.	15.00	IPP-VER	GS390
26	Tekirdağ-Şarköy	Alize Enerji Elektrik Üretim A.Ş.	28.80	IPP-VER	GS577
27	İzmir-Urla	Kores Kocadağ Rüzgar Enerji Santralı Üretim A.Ş.	15.00	IPP-VER	GS601
28	Balıkesir-Bandırma	As Makinsan Temiz Enerji Elektrik Üretim San. ve Tic. A.Ş.	20.00	IPP-VER	GS683
29	İzmir-Çeşme	Ares Alaçatı Rüzgar Enerjisi Sant. San. ve Tic. A.Ş.	7.20	BOT	-

[33] http://www2.epdk.org.tr/lisans/elektrik/yek/ruzgarprojeleriningelisimi.xls

30	Çanakkale-Bozcaada	Bores Bozcaada Rüzgar Enj. Sant. San. ve Tic. A.Ş.	10.20	BOT	-

Sub-step 4b: Discuss any similar options that are occurring

Two of the projects given in Table 14 (No. 29 and 30) are realised as BOT (Build Operate Transfer) plants, that means operated with guaranteed income and will be transferred to the state after defined period[34] which is different model with IPPs (Independent Power Producer) as project activity since, IPPs sells electricity to the market without any guaranteed selling price. The feed-in-tariff, which is given for ten years to IPPs based on renewable sources (55 €/MWh) is not enough to make these kind of investments financially attractive as it is demonstrated for the project activity in Step-2 part of section B.5 of the PDD.

Three of the projects given in Table 14 (No. 1, 10 and 11) there are no further information on the circumstances for their implementation, however, due to small capacity; these projects could be considered as R&D investment of the companies and cannot be considered similar activity. Nevertheless, their size alone gives a reason for not including them into the common practice analysis, as the investment risks are far away from those for Kayaduzu WPP.

All other projects given in Table 14 are realised as VER projects. Karakurt[35], Bares[36] and Sebenoba[37] projects (No. 3, 12 and 15) are registered as VER+. All remaining 22 projects are developed as GS-VER projects[38].

Step 4. Conclusions:

There are 30 wind projects in operation as April 2011. As shown above, the observed activities in the Turkish wind market can either not be considered similar, as they were realised under a different environment, or do not have to be included in this analysis since they are realised as VER or VER applicants. Thus, no similar options occur, showing that wind power is far from being common practice in Turkey.

Additionality Conclusions:

Summarizing the explanations above one can state that the commercial risks are high for this project. Taking into consideration the significant technological and investment barriers and barriers due to prevailing practice in conjunction with renewable energies and specifically with wind energy in Turkey, investors are unlikely to invest into the project in the absence of carbon finance.

The emissions reductions from the proposed project are therefore additional to what would have occurred in the absence of the GS-VER project activity.

[34] See, http://www.teias.gov.tr/eng/ApkProjection/CAPACITY%20PROJECTION%202008-2017.pdf (page 37)

[35] See, http://www.netinform.net/KE/Wegweiser/Guide2.aspx?ID=3784&Ebene1_ID=49&Ebene2_ID=1152&mode=4

[36] See, http://www.netinform.net/KE/Wegweiser/Guide2.aspx?ID=6081&Ebene1_ID=49&Ebene2_ID=1943&mode=4

[37] See, http://www.netinform.net/KE/Wegweiser/Guide2.aspx?ID=3781&Ebene1_ID=49&Ebene2_ID=1116&mode=4

[38] See, https://gs1.apx.com/myModule/rpt/myrpt.asp?r=111

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Baseline scenario is identified and described in B.4. Emission reductions due to project activity will be calculated according to *"Tool to calculate the emission factor for an electricity system"* (Tool)[39] as indicated in ACM0002 ver. 12.

A brief explanation of this methodology is given in Tool as (page 2):

> *"This methodological tool determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "operating margin" (OM) and "build margin" (BM) as well as the "combined margin" (CM). The operating margin refers to a cohort of power plants that reflect the existing power plants whose electricity generation would be affected by the proposed CDM project activity. The build margin refers to a cohort of power units that reflect the type of power units whose construction would be affected by the proposed CDM project activity*".

This tool may be applied for following purposes.

> *"This tool may 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 (e.g. demand-side energy efficiency projects)."*

> The project activity at hand does substitute grid electricity and therefore fulfils this applicability criterion. This tool provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{grid,CM,y}$	tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year *y*
$EF_{grid,BM,y}$	tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year *y*
$EF_{grid,OM,y}$	tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year *y*

> *":..the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in Annex 2 - Procedures related to off-grid power generation should be met."*

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

Corresponding formulations and calculations of CM factor and emission reductions are shown in B.6.3

[39] See, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf (version 02)

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	**Gross electricity generation**
Data unit:	**MWh**
Description:	Gross Electricity supplied to the grid by relevant sources (2006-2008)
Source of data used:	Turkish Electricity Transmission Company (TEIAS), Annual Development of Turkey's Gross Electricity Generation of Primary Energy Resources (1940-2008) TEIAS, see: http://www.teias.gov.tr/istatistik2008/32(75-08).xls
Value applied:	See **Table** 18
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Any comment:	

Data / Parameter:	**Net electricity generation**
Data unit:	**GWh**
Description:	Net electricity fed into the grid. Used for the calculation of the net/gross relation (Including Import and Export figures) (2006-2008)
Source of data used:	Turkish Electricity Transmission Company (TEIAS), Annual Development of Electricity Generation- Consumption and Losses in Turkey (1984-2008) TEIAS, see: http://www.teias.gov.tr/istatistik2008/30(84-08).xls
Value applied:	See **Table 19**, **Table 20**
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data is used to find relation between the gross and net electricity delivered to the grid by fossil fuel fired power plants (Table 19). Import and Export data is used to find total net electricity fed into the grid in the years of 2006, 2007 and 2008 (Table **20**). TEIAS is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Any comment:	

Data / Parameter:	**HVi,y**
Data unit:	**Mass or volume unit**
Description:	Heating Values of fuels consumed for electricity generation in the years of 2006, 2007 and 2008
Source of data used:	Heating Values Of Fuels Consumed In Thermal Power Plants In Turkey By The Electric Utilities, TEİAŞ. See: http://www.teias.gov.tr/istatistik2008/46.xls
Value applied:	See **Table 25**
Justification of the choice of data or description of	TEİAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey.

measurement methods and procedures actually applied :	There is no national NVC data in Turkey. However, TEİAŞ announces Heating values of fuels. This data is used to calculate annual NCVs for each fuel type.
Any comment:	

Data / Parameter:	**FCi,y**
Data unit:	Mass or volume unit
Description:	Fuels consumed for electricity generation in the years of 2006, 2007 and 2008
Source of data used:	Annual Development of Fuels Consumed In Thermal Power Plants In Turkey By The Electric Utilities, TEİAŞ. See: http://www.teias.gov.tr/istatistik2008/44.xls
Value applied:	See **Table 26**
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEİAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Any comment:	

Data / Parameter:	**NCVi,y**
Data unit:	TJ/kton, TJ/million m3
Description:	Net Calorific Value of fuel types in the years of 2006, 2007 and 2008
Source of data used:	Calculated by using HVi,y to FCi,y as Net Calorific Values of fuel types are not directly available in Turkey.
Value applied:	See **Table 27, Table 25, Table 26**
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEİAŞ is the national electricity transmission company, which makes available the official data of power plants in Turkey. Calculation of NCVs from national HVi,y and FCi,y data is preferred to default IPCC data as these are more reliable.
Any comment:	

Data / Parameter:	**Sample Group for BM emission factor**
Data unit:	Name of the plants, MW capacities, fuel types, annual electricity generations and dates of commissioning.
Description:	Most recent power plants which compromise 20% of total generation
Source of data used:	Annual Development Of Fuels Consumed In Thermal Power Plants In Turkey By The Electric Utilities, TEIAS: http://www.teias.gov.tr/istat2004/7.xls (for 2004) http://www.teias.gov.tr/istatistik2005/7.xls (for 2005) http://www.epdk.org.tr/yayin_rapor/elektrik/yayin/uretimKapasiteProjeksiyonu.pdf (page 76 and 77, for 2006) http://www.epdk.org.tr/yayin_rapor/elektrik/yayin/uretimKapasiteProjeksiyonu2008_2017.pdf (page 121 and 122, for 2007) http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf (Page 95 for 2008 Plants and Pages 82-94 for Fuel Types and Generation Amounts)
Value applied:	See **Table 22**

Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS is the national electricity transmission company, which makes available the official data of all power plants in Turkey. The latest data available during PDD preparation was for 2008.
Any comment:	

Data / Parameter:	$\mathbf{EF_{CO2,m,i,y}}$
Data unit:	tCO_2/GJ
Description:	Emission factor for fuel type I
Source of data used:	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the IPCC Guidelines on National GHG Inventories. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied:	See **Table 15**
Justification of the choice of data or description of measurement methods and procedures actually applied :	No plant specific and national emission factor data is available in Turkey. So, IPCC default data is used. For Fuel Oil Power Plants: 'Gas/Diesel Oil' data is used for conservativeness. For Coal Power Plants: In the 205th page of official document given in the link below, it is stated that Çolakoğlu and İçdaş utilizes 'Taşkömürü' (Hardcoal). And at the Table-2 in page 157 of the same document, Taşkömürü is dived in two groups: Bituminous and Antharcite. Since Sub-Bituminous Coal is under Brown Coal in the same table and since Other Bituminous Coal has lower EF than Anthracite in 1.4 of IPCC Guidelines, EF for 'Other Bituminous Coal' is used. See: http://www.dpt.gov.tr/DocObjects/Icerik/4225/Enerji_Hammaddeleri_(Linyit_Taskömuru-Jeotermal)
Any comment:	

Data / Parameter:	$\mathbf{\eta_{m,y}}$
Data unit:	-
Description:	Average energy conversion efficiency of power unit m in year y
Source of data used:	Annex I the "Tool to calculate the emission factor for an electricity system", Version 02
Value applied:	See **Table** 23
Justification of the choice of data or description of measurement methods and procedures actually applied :	For Lignite and Coal power plants, the highest efficiency rate for 'fluidized bed' technology which is 41.5% for PFBS is applied as coal PPs in the sample group (Çolakoğlu (Capacity Increment) and İçdaş Çelik Gr-I) are utilizing fluidized bed type technology. For reference see: http://www.mimag-samko.com.tr/akiskan_yatakli_kazanlar.pdf (last paragraph of page 6) For Natural Gas and Oil plants efficiencies, default value given in the tool is applied: http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf
Any comment:	

B.6.3. Ex-ante calculation of emission reductions:

Stepwise approach of „*Tool to calculate the emission factor for an electricity system*" version 02 [40] is used to find this combined margin (emission coefficient) as described below:

Step 1. Identify the relevant electric power system

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

> "*TEIAS shall be in charge of all transmission activities to be performed over the existing transmission facilities and those to be constructed as well as the activities pertaining to the operation of* ***national transmission system*** *via the National Load Dispatch Center and the regional load dispatch centers connected to this center and the operation of Market Financial Reconciliation Center*[41]".

As it can be understood from this phrase, only one transmission system, which is national transmission system is defined and only TEİAŞ is in the charge of all transmission system related activities. Moreover, a communication with representative of TEIAS, which indicates that: "*There are not significant transmission constraints in the national grid system which is preventing dispatch of already connected power plants*" is submitted to the DOE. Therefore, the national grid is used as electric power system for project activity. The national grid of Turkey is connected to the electricity systems of neighboring countries. Complying with the rules of the tool, the emission factor for imports from neighboring countries is considered 0 (zero) tCO_2/MWh for determining the OM.

There is no information about interconnected transmission capacity investments, as TEİAŞ, who operates the grid, also didn't take into account imports-exports for electricity capacity projections.[42] Because of that, for BM calculation transmission capacity is not considered.

Step 2. Select an operating margin (OM) method

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

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

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

Step 3: Select an operating margin (OM) method

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

Table 16: Share of Low Cost Resource (LCR) Production 2004-2008 (Production in GWh)

[40] See, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf

[41] See, http://www.epdk.org.tr/english/regulations/electric/license/licensing.doc (page 21)

[42] See, http://www.epdk.org.tr/yayin_rapor/elektrik/yayin/uretimKapasiteProjeksiyonu2008_2017.pdf (page 39)

	2004	2005	2006	2007	2008
Gross production	150,698.3	161,956.2	176,299.8	191,558.1	198,418.0
TOTAL LCR Production	46,338.6	39,836.3	44,618.7	36,575.6	34,498.6
Hydro	46,083.7	39,560.5	44,244.2	35,850.8	33,269.8
Renewables and Waste	104.0	122.4	154.0	213.7	219.9
Geothermal and Wind	150.9	153.4	220.5	511.1	1,008.9
Share of LCRs	*30.75%*	*24.60%*	*25.31%*	*19.09%*	*17.39%*
Average of last five years	**23.43%**				

As average share of low cost resources for the last five years is far below 50% (23.43%), the simple OM method is applicable to calculate the operating margin emission factor ($EF_{grid,OM,y}$)

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

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

The **ex ante option is selected for Simple OM method**, with the most recent data for the baseline calculation stemming from the years 2006 to 2008.

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

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants. The calculation of the simple OM emission factor can be based on

- **Option A:** data on net electricity generation a CO_2 emission factor of each power unit, or
- **Option B:** data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B is chosen to calculate the Simple OM, as there is no power plant specific data available, renewable power generation are considered as low-cost power sources and amount of electricity supplied to the grid by these sources is known.

Where Option B is used, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost / must-run power plants, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

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

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)

$FC_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

$NCV_{i,y}$	=	Net calorific value (of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EG_y	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i	=	All fossil fuel types combusted in power sources in the project electricity system in year y
y	=	three most recent years for which data is available at the time of submission of the PDD to the DOE for validation

For the calculation of the OM the consumption amount and heating values of the fuels for each sources used for the years 2006, 2007 and 2008, is taken from the TEİAŞ[43] annual statistics, which holds data on annual fuel consumption by fuel types as well as electricity generation amounts by sources and electricity imports. All the data needed for the calculation, including the emission factors and net calorific values (NCVs), are provided in Annex 3. Total CO_2 emission due to electricity generation in Turkey for the years of 2006, 2007 and 2008 are given in **Table 17**.

Table 17: CO_2 emissions from electricity production 2006-2008 ($ktCO_2$)

	2006	2007	2008
CO_2-Emmissions	82,562	97,649	103,352

Table 18 presents the gross electricity production data by all the relevant energy sources. Low-cost/must run resources like hydro, wind, geothermic and biomass do not emit fossil CO_2 and thus are not taken into account in calculations.

Table 18: Gross electricity production by fossil energy sources 2006-2008 (GWh)

Energy Source	2006	2007	2008
Natural Gas	80,691.2	95,024.8	98,685.3
Lignite	32,432.9	38,294.7	41,858.1
Coal	14,216.6	15,136.2	15,857.5
Fuel Oil	4,232.4	6,469.6	7,208.6
Motor Oil	57.7	13.3	266.3
Naphtha	50.2	43.9	43.6
LPG	0.1	0.0	0.0
Total fossil fuels	**131,681.1**	**154,982.5**	**163,919.4**

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

Table 19: Net/gross electricity production 2006-2008 (GWh)

	2006	2007	2008
Gross Production	176,299.80	191,558.13	198,418.00
Net Production	169,543.10	183,339.70	189,761.90
Relation	**96.17%**	**95.71%**	**95.64%**

[43] See TUIK, http://www.tuik.gov.tr/PreHaberBultenleri.do?id=4078&tb_id=3 (cell Q7 for 2005, R7 for 2006 and S7 for 2007)

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

Table **20** shows the resulting net data for fossil fuel generation and adds electricity imports.

Table 20: Electricity supplied to the grid, relevant for OM (GWh)

	2006	**2007**	**2008**
Net El. Prod. by fossil fuels	126,634.4	148,333.3	156,768.3
Electricity Import	573.2	864.3	789.4
Electricity supplied to grid by relevant sources	**127,207.6**	**149,197.6**	**157,557.7**

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

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

Table 21: Calculation of Weighted $EF_{grid,OMsimple,y}$ ($ktCO_2/GWh$)

	2006	**2007**	**2008**
CO_2-Emmissions ($ktCO_2$)	82,562	97,649	103,352
Electricity Supplied to Grid by relevant sources (GWh)	127,207.6	149,197.6	157,557.7
$EF_{grid,OMsimple,y}$ ($ktCO_2/GWh$)	0.6490	0.6545	0.6560
3-year Generation Weighted Average $EF_{grid,OMsimple,y}$ ($ktCO_2/GWh$)	**0.6534**		

➔ **$EF_{grid,OMsimple,y} = 0.6534 (ktCO_2/GWh)$**

Step 5. Identify the cohort of power units to be included in the build margin

Build Margin calculations are performed with the sample group of power units *m* consisting of either:

(a) The set of five power units that have been built most recently, or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently

Option (b) is used to identify the sample group, as this option comprises the larger annual generation in Turkey. In 2008, gross electricity generation amount was 198,418 GWh and 20% of this is 39,683.6 GWh.

The last plant of the sample group is built in 2004 and until the end of the 2008 (which is the latest year for official statistics published for plants put in operation) there were 12 VER projects. Because of the last plant of the sample group was built 4 years ago (not more than 10 years ago), VER plants are excluded from sample group.

While identifying the sample group dismantled, revised, retrofits are not included. Only new capacity additions (power plants / units) are taken into account.

Sample group for BM emission factor is given below table. The derivation of the values presented in Table **22** is contained in a separate excel file which is available for validation.

Table 22: Sample group generation for BM emission factor calculation (GWh)

Energy Source	2004	2005	2006	2007	2008	Total
Natural Gas	8,810.4	7,068.4	3,119.1	2,552.1	2,400.0	**23,950.5**
Lignite	0.0	4,420.0	7,020.0	0.0	0.0	**11,440.0**
Coal	337.5	1,125.0	0.0	0.0	0.0	**1,462.5**
Fuel Oil	789.2	99.1	0.0	800.0	103.2	**1,791.4**
Hydro	241.8	1,028.8	482.6	1,217.0	1,629.0	**4,599.2**
Renewables	0.0	87.4	453.1	11.0	167.8	**719.3**
TOTAL	**10,178.9**	**13,828.7**	**11,074.7**	**4,580.1**	**4,300.0**	**43,962.3**

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

Step 6. Calculate the build margin emission factor

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

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

Where:

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

Because of only fuel types and electricity generation data are available for the sample group, *Option B2* of Simple OM method is used to calculate emission factor. The formulation of emission factor is given below:

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

Where:

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$EF_{CO2,m,i,y}$	=	Average CO_2 emission factor of fuel type i used in power unit m in year y (tCO_2/GJ)
$\eta_{m,y}$	=	Average net energy conversion efficiency of power unit m in year y (%)
y	=	Three most recent years for which data is available at the time of submission of the PDD to the DOE for validation

BM emission factor calculation and resulted BM factor is given in the Table 23. For BM factor calculation, since no official emission factors for different fuel types are available, lower confidence default values of IPCC Guidelines are applied. Explanation of emission factor selection for each energy sources and references are given in B.6.2 part of the PDD.

Table 23: BM emission factor calculation using equation (2) and (3)

Energy Source	Sample Group Total Generation (GWh)	Effective CO_2 emission factor (tCO_2/TJ)	Average Efficiency ($\eta_{m,y}$)	CO2 Emission ($ktCO_2$)
Natural Gas	23,950.0	54.3	60.00%	7,802.9
Lignite	11,440.0	90.9	41.50%	9,020.8
Coal	1,462.5	89.5	41.50%	1,135.5
Fuel Oil	1,791.4	72.6	46.00%	1,017.8
Hydro	4,599.2	0.0	0.00%	0.0
Renewables	719.3	0.0	0.00%	0.0
Total	***43,962.3***			***18,977.0***
$EF_{grid,BM,y}$ (tCO_2/MWh)	**0.4317**			

➔ **$EF_{grid,BM,y}$ = 0.4317 tCO_2/MWh**

Step 7. Calculate the combined margin emission factor

The combined margin emission factor is calculated as follows:

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

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = 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 (%)

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

***$EF_{grid,CM,y}$* = 0.6534 tCO_2/MWh * 0.75 + 0.4317 tCO_2/MWh * 0.25 = 0.5980 tCO_2/MWh**

➔ ***$EF_{grid,CM,y}$* = 0.5980 tCO_2/MWh**

Emission reductions are calculated as follows:

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

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

Project emissions

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

Leakage

LEy is 0, as it is not considered according to ACM0002 (Version 12, page 10). PEy is 0 because project is a wind power generation activity (Only for Geothermal and Hydro project activities, it should be considered according to ACM0002, Version 12, page 7).

Then: $ER_y = BE_y$

Baseline emissions

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

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

Where:
BE_y = Baseline emissions in year y (tCO_2/yr).
EG_y = Electricity supplied by the project activity to the grid (MWh).
$EG_{baseline}$ = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero.
$EF_{grid,CM}y$ = Combined margin 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", Version 02.

The project activity is the installation of a new grid-connected renewable power plant so, $EG_{baseline} = 0$
Then:

$$\boldsymbol{ER_y = BE_y = EG_y * EF_{grid,CM,} = 111{,}670\ MWh/year * 0.5980\ tCO_2/MWh = 66{,}777\ tCO_2/year}$$

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2 e
2012**	0	52,865	0	52,865
2013	0	66,777	0	66,777
2014	0	66,777	0	66,777
2015	0	66,777	0	66,777
2016	0	66,777	0	66,777

2017	0	66,777	0	66,777
2018	0	66,777	0	66,777
2019**	0	13,912	0	13,912
Total (tonnes of CO_2e)	0	**467,439**	**0**	**467,439**

* 9.5 months operation in 2012
** 2.5 months operation in 2019

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG_{facility,y}$**
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant to the grid in year *y*
Source of data to be used:	On site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	**111,670 MWh/year**
Description of measurement methods and procedures to be applied:	• Regarding the electricity meters: two meters will be placed (one main and one reserve) at the TEIAS substation. These meters are sealed by TEIAS and intervention by project proponent is not possible. The fact that two meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is not only in the interest of the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyers. • Measured hourly and readings monthly. Monthly settlement notifications of PMUM consist hourly electricity production and withdrawn from the grid. • Since the meters are reading electricity supplied to the system and withdrawn from the system separately, the net electricity amount supplied to the grid will be calculated by electricity supplied minus electricity withdrawn which will be taken from monthly settlement notifications. The above described measurement method follows Article 81 of the official regulation "Electricity Market Balancing And Settlement Regulation"[44]
QA/QC procedures to be applied:	As stated at the end of the first paragraph of A.2 part of this PDD (page 2), Kayaduzu WPP will be connected to the grid with 154 kV voltage level. According to the first paragraph of the sub-clause b) of Provisional Article 4 of the 'Communiqué Regarding the Meters to be used in the Electricity Market '[45] (Communiqué):

[44] See, http://www.epdk.org.tr/mevzuat/yonetmelik/elektrik/dengeleme/yeni/degisiklik06112010.doc page 13
[45] See, http://www.epdk.org.tr/english/regulations/electric/meters.doc, page 1

	'The measurement points of the generation facilities connected to the transmission system transformers over high voltage lines (66 kV, 154kV or 380kV) shall be at the ***exit side of the group step up transformers of the generation facilities****.'* According to the 2. Article of the Communiqué : '*The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained* ***"Type and System Approval" certificate from the Ministry of Trade and Industry.'*** Therefore, Ministry of Trade and Industry (Ministry) is responsible from control and calibration of the meters. b) paragraph of the 9th Atricle of the 'Regulation of Metering and Testing of Metering Systems'[46] (Regulation) of Ministry states that: ' *b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done* ***every 10 years****.'* Therefore periodic calibration of the meters will be done every 10 years. Also according to 67th article (page 20) of this regulation, the calibration shall be done in calibration stations, which have been tested and approved by Ministry of Trade and Industry. Article 10 d) of Communiqué requires the meters shall be three phase four wire and Article 64 of Regulation clearly states how calibration shall be performed for this kind of meters. According to 3. Article of System Usage Agreement[47] done by Merzifon and TEIAS; other than periodic tests, if a party alleges the meters are not working appropriately tests of the meters will be done by presence of both parties. If, after controls, it is seen that the meter is not working appropriately, the measurements of reserve meters are taken into account beginning from date both meters are reading the same (page 3, 2-c) As above mentioned, the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan.
Any comment:	

B.7.2. Description of the monitoring plan:

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

[46] See, http://www.sanayi.gov.tr/download/osgm/olcu_aletleri_muayene_yonetmelik.zip, page 2

[47] See, http://www.teias.gov.tr/sistemkullanim1.doc page 3, 2-b

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

Given a data vintage based on ex ante monitoring and selection of a renewable 7 year crediting period, the Combined Margin will be recalculated at any renewal of the crediting period using the valid baseline methodology.

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

The plant manager or specialised, appointed by the plant manager, will be responsible for data collection and storage.

Operational and Management Structure

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

At the end of each monitoring period, which is planned to generally last one year, from the monthly meter reading records the net electricity generation amounts as calculated by electricity supplied to the grid minus withdrawn from the system, and result data will be multiplied with the combined margin emission factor with the help of an excel spreadsheet that also contains the combined margin calculation. Thus, the complete baseline approach is always transparent and traceable. For the elaboration and quality assurance of the monitoring report, FutureCamp Türkiye, an expert in the project mechanisms who already supported in the project design, is assigned. However, in order to continue improving the monitoring procedures and therefore also the future monitoring reports, internal quality check shall be fulfilled by FutureCamp Türkiye.

For the operation of Kayaduzu WPP, below hierarchy is planned:

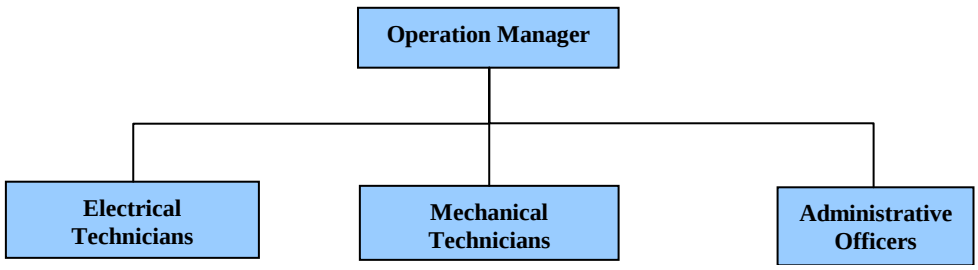

Figure 6: Operation and Management diagram

Table 24: Descriptions of Jobs and Responsibilities in Kayaduzu WPP

Job Name	Job Description	Graduation Level	Staff Quantity	Prescribed Trainings
Electrical Technician	Measuring the electricity generation through the proper methods and instruments. Data storing and reporting to Operational Manager and Grid Operator (TEIAS)	Technician high school (electricity division)	5 person/shift (2 shifts/day)	Grid Operator's Trainings and Electrical Trainings by Equipment Supplier (has to be decided)
Mechanical Technician	Making periodical and failure maintenances programmes and activities. Following and fulfilling the guarantee procedures.	Technician high school (electricity or mechanical division)	5 person/shift (2 shifts/day)	Mechanical Trainings by Equipment Supplier (has to be decided)
Security Officer	Securing power plant parameter		2 person/shift (2 shifts/day)	.

Staff quantity given in above (total 14) subject to change as the project is early phase of implementation.

Merzifon will keep all the data needed for the calculation of emission reductions during the crediting period and until two years after the last issuance of GS VERs for Kayaduzu WPP.

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

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

Date: 05/11/2010

Name of entity determining the baseline: FutureCamp İklim ve Enerji Ltd. Şti. (FutureCamp Türkiye) (project consultant)

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Contributor: Merzifon Enerji A.S.

FutureCamp Türkiye is not a project participant.

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

The project activity begins on 06/10/2010, the date of electromechanical agreement.

C.1.2. Expected operational lifetime of the project activity:

The expected lifetime of the Kayaduzu WPP is 20 years, 0 months.[48].

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

Renewable crediting period shall be applied.

C.2.1.1. Starting date of the first crediting period:

Starting date of the first crediting period is the commercial start of the plant: 17/03/2012.

C.2.1.2. Length of the first crediting period:

The length of the first crediting period is 7 years, 0 months.

C.2.2. Fixed crediting period:

Fixed crediting period is not applicable.

C.2.2.1. Starting date:

Not Applicable.

C.2.2.2. Length:

Not Applicable.

[48] See, http://www.nordex-online.com/fileadmin/MEDIA/Gamma/Nordex_Gamma_en.pdf (page 4, paragraph 2)

SECTION D. Environmental impacts

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Please refer to LSC Report and Gold Standard Passport for detail information for Environmental Impacts of the project

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

Please refer to LSC Report and Gold Standard Passport for detail information for Environmental Impacts of the project

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

Please refer to LSC Report and Gold Standard Passport for detail information for Stakeholder comments

E.2. Summary of the comments received:

Please refer to LSC Report and Gold Standard Passport for detail information for Stakeholder comments

E.3. Report on how due account was taken of any comments received:

Please refer to LSC Report and Gold Standard Passport for detail information for Stakeholder comments

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Merzifon Enerji A.S.
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Represented by:	
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Middle name:	
First name:	Türker
Department:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

--- NOT APPLICABLE---

Annex 3

BASELINE INFORMATION

Calculation of Total CO_2 from OM Power Plants:

Table 25: $HV_{i,y}$ (Heating Values for Fossil Fuels for Electricity Generation (TCal)

Energy Sources	2006	2007	2008
Hard Coal+Imported Coal	29,504	32,115	33,310
Lignite	83,932	100,320	108,227
Fuel Oil	16,769	21,434	20,607
Diesel Oil	627	517	1,328
LPG	0	0	0
Naphta	141	118	113
Natural Gas	150,588	179,149	189,057

Table 26: $FC_{i,y}$ (Fuel Consumptions for Fossil Fuels for Electricity Generation (million m^3 for Natural Gas and ton for others)

Energy Sources	2006	2007	2008
Hard Coal+Imported Coal	5,617,863	6,029,143	6,270,008
Lignite	50,583,810	61,223,821	66,374,120
Fuel Oil	1,746,370	2,250,686	2,173,371
Diesel Oil	61,501	50,233	131,206
LPG	33	0	0
Naphta	13,453	11,441	10,606
Natural Gas	17,034,548	20,457,793	21,607,635

1	**Tcal**	**=**	**4.1868**	**TJ**

Table 27: $NCV_{i,y}$ (Average Net Calorific Values for Fossil Fuels for Electricity Generation (TJ/million m^3 for Natural Gas and TJ/kton for others) and EF_i (Emission Factor of Fossil Fuels)

Energy Sources	NCVi 2006	NCVi 2007	NCVi 2008	EF_i
Hard Coal+Imported Coal	21.99	22.30	22.24	89.50
Lignite	6.95	6.86	6.83	90.90
Fuel Oil	40.20	39.87	39.70	72.60
Diesel Oil	42.68	43.09	42.38	72.60
LPG	0.00	0.00	0.00	61.60
Naphta	43.88	43.18	44.61	69.30
Natural Gas	37.01	36.66	36.63	54.30

Table 28: CO_2 Emission by each Fossil Fuels Types ($ktCO_2e$)

Energy Sources	2006	2007	2008
Hard Coal+Imported Coal	11,056	12,034	12,482
Lignite	31,943	38,180	41,189
Fuel Oil	5,097	6,515	6,264
Diesel Oil	191	157	404

Lpg	0	0	0
Naphta	41	34	33
Natural Gas	34,235	40,728	42,981
TOTAL	**82,562**	**97,649**	**103,352**

Identification of Sample Group

Table 29: Sample Group PPs for BM Emission Factor Calculation

Name of Power Plant	Capacity (MW)	Average Generation (GWh)	Fuel Type	Date of Operation
ANKARA D.G.(BAYMİNA) GR-I-II-III	798.0	6,500.0	N. Gas	08.01.2004
ENTEK GR-IV	31.1	255.7	N.GAS+NAPHTA	12.02.2004
ATATEKS 2 GM	5.6	45.0	N. Gas	20.02.2004
TANRIVERDİ 4 GM	4.7	38.7	N. Gas	24.03.2004
ÇOLAKOĞLUB(CAPACITY INCREMENT)	45.0	337.5	IMPORTED COAL	05.05.2004
TEKBOY TEKSTİL 1 GM	2.2	16.0	N. Gas	18.05.2004
GÜL ENERJİ GR-II	12.5	96.5	Fuel Oil	03.06.2004
KOMBASSAN KAĞIT GIDA VE TEKS	5.5	38.1	N. Gas	09.06.2004
AYEN OSTİM ENERJİ ÜRETİM	31.1	264.1	N. Gas	11.06.2004
BİS ENERJİ 2 GT	73.0	602.7	N. Gas	16.06.2004
ENERJİ-SA ADANA 1 BT	49.8	322.9	NAPHTA	23.06.2004
ŞAHİNLER ENERJİ 1 GM	3.2	22.2	N. Gas	29.06.2004
BESLER GR-2, BT (5,2+7,5)	12.7	97.7	N. Gas	07.07.2004
ÇELİK ENERJİ ÜR.ŞTİ. 2 GM	2.4	18.6	N. Gas	09.07.2004
KOMBASSAN KAĞ. MATBAA GIDA	5.5	35.7	N. Gas	24.09.2004
AYEN OSTİM ENERJİ ÜRETİM (BT)	9.9	84.0	N. Gas	01.10.2004
HABAŞ ALİAĞA GRUP I-II	89.2	713.9	N. Gas	08.10.2004
STANDART PROFİL 3 GM	6.7	49.2	N. Gas	22.10.2004
KARKEY-II 3+3 DGM	54.3	369.7	Fuel Oil	12.11.2004
ALTINMARKA GIDA GR I-II-III	3.6	28.8	N. Gas	17.12.2004
ERE (BİR KAPILI HES) GRUP-I	48.5	170.6	Hydro (Run of River)	11.03.2004
ELTA ELK (DODURGA) GR-I-II-III-IV	4.1	12.3	Hydro (Run of River)	26.04.2004
İSKUR TEKSTİL (SÜLEYMANLI) GR I-II	4.6	17.9	Hydro (Run of River)	28.04.2004
BEREKET EN. (Feslek Hes) Gr-1-2	9.5	41.0	Hydro (Run of River)	05.08.2004
ÇAN GR I	160.0	1,040.0	LIGNITE	15.02.2005
ÇAN GR II	160.0	1,040.0	LIGNITE	15.03.2005
ELBİSTAN-B GR I	360.0	2,340.0	LIGNITE	15.02.2005
AKBAŞLAR GR-II (Isolated)	8.8	73.0	N.GAS	24.06.2005
AKÇA ENERJİ GR-III	8.7	65.4	N.GAS+NAPHTHA	14.12.2005
AYKA TEKSTİL GR-I	5.5	40.0	N. Gas	24.09.2005
BAYDEMİRLER GR IV-V-VI	6.2	51.4	N. Gas	04.02.2005
BOSEN GR-III	50.0	350.0	N. Gas	30.12.2005
ÇUMRA ŞEKER	16.0	40.0	N.GAS+LIGNITE	01.01.2005
ETİ MAD.(BAN.ASİT)GR-I	11.5	85.0	RENEW.+WASTES	15.07.2005

EVYAP GR I-II	5.1	30.0	N. Gas	27.08.2005
GRANİSER GRANİT GR-I	5.5	42.0	N. Gas	14.11.2005
HABAŞ ALİAĞA GR III	47.7	381.6	N. Gas	02.06.2005
HABAŞ ALİAĞA GR IV	47.7	381.6	N. Gas	21.09.2005
HABAŞ ALİAĞA GR-V	24.6	196.8	N. Gas	24.11.2005
HAYAT KAĞIT GR-I	7.5	56.0	N. Gas	27.05.2005
İÇDAŞ ÇELİK GR-I	135.0	1,080.0	IMPORTED COAL	30.11.2005
KAHRAMANMARAŞ KAĞIT GR-I	6.0	45.0	IMPORTED COAL	08.12.2005
KORUMA KLOR GR I-II-III	9.6	77.0	N. Gas	03.12.2005
KÜÇÜKÇALIK TEKSTİL GR I-II-III-IV	8.0	64.0	N. Gas	27.11.2005
MERCEDES BENZ TURK GR I-II-III-IV	8.3	68.0	N. Gas	04.02.2005
MODERN ENERJİ GR-III	8.4	62.9	N. Gas	14.06.2005
MODERN ENERJİ GR-II	6.7	50.4	N.GAS+LPG	14.06.2005
MOSB GR I-II-III-IV-V-VI-VII	84.8	434.0	N. Gas	01.03 - 01.08.2005
ORS RULMAN	12.4	99.4	N. Gas	25.08.2005
PAK GIDA (Kemalpaşa) GR-I	5.7	45.0	N. Gas	07.12.2005
TEZCAN GALVANİZ GR I-II	3.7	29.0	N. Gas	27.05.2005
YONGAPAN(KAST.ENTG) GR-II	5.2	32.7	N. Gas	25.05.2005
ZEYNEP GİYİM SAN. GR-I	1.2	9.0	N. Gas	07.07.2005
AK ENERJİ(K.paşa) GR- III	40.0	256.9	N. Gas	09.11.2005
AK ENERJİ(K.paşa) GR I-II	87.2	560.1	N. Gas	30.04.2005
ALTEK ALARKO GR I-II	60.1	420.0	N. Gas	14.10.2005
BİS ENERJİ GR VII	43.7	360.8	N. Gas	18.03.2005
CAN ENERJİ GR-I	3.9	28.0	N. Gas	25.08.2005
ÇEBİ ENERJİ BT	21.0	164.9	N. Gas	27.08.2005
ÇEBİ ENERJİ GT	43.4	340.1	N. Gas	23.08.2005
ENTEK ELK.A.Ş.KOÇ ÜNİ.GR I-II	2.3	19.0	N. Gas	07.02.2005
KAREGE GR IV-V	18.1	141.9	N. Gas	07.04.2005
KARKEY(SİLOPİ-4) GR-IV	6.2	47.2	Fuel Oil	30.06.2005
KARKEY(SİLOPİ-4) GR-V	6.8	51.9	Fuel Oil	23.12.2005
METEM ENERJİ(Hacışıramat) GR I-II	7.8	58.0	N. Gas	29.01.2005
METEM ENERJİ(Peliklik) GR I-II-III	11.7	89.0	N. Gas	29.01.2005
NOREN ENERJİ GR-I	8.7	70.0	N. Gas	24.08.2005
NUH ENERJİ-2 GR I	47.0	319.7	N. Gas	24.05.2005
ZORLU ENERJİ KAYSERİ GR-I-II-III	149.9	1,144.1	N. Gas	22.07.2005
ZORLU ENERJİ KAYSERİ GR-IV	38.6	294.9	N. Gas	26.10.2005
ZORLU ENERJİ YALOVA GR I-II	15.9	122.0	N. Gas	26.11.2005
TEKTUĞ(Kargılık) GR I-II	23.9	83.0	Hydro (Run of River)	25.04.2005
İÇTAŞ ENERJİ(Yukarı Mercan) GR I-II	14.2	44.0	Hydro (Run of River)	02.05.2005
MURATLI GR I-II	115.0	444.0	Hydro (with Dam)	03.06.2005
BEREKET EN.(DALAMAN) GR XIII-XIV-XV	7.5	35.8	Hydro (Run of River)	16.07.2005
YAMULA GRUP I-II	100.0	422.0	Hydro (with Dam)	31.07.2005
SUNJÜT(RES) GR I-II	1.2	2.4	Wind	23.04.2005
EKOTEN TEKSTİL GR-I	1.9	14	N. Gas	16.02.2006
ERAK GİYİM GR-I	1.4	10.0	N. Gas	22.02.2006
ALARKO ALTEK GR-III	21.9	173.0	Steam	23.02.2006
AYDIN ÖRME GR-I	7.5	60.0	N. Gas	25.02.2006

NUH ENERJİ-2 GR-II	26.1	180.1	Steam	02.03.2006
MARMARA ELEKTRİK (Çorlu) GR-I	8.7	63.0	N. Gas	13.04.2006
MARMARA PAMUK(Çorlu) GR-I	8.7	63.0	N. Gas	13.04.2006
ENTEK (Köseköy) GR-IV	47.6	378.2	N. Gas	14.04.2006
ELSE TEKSTİL (Çorlu) GRI-II	3.2	25.0	N. Gas	15.04.2006
SÖNMEZ ELEKTRİK (Çorlu) GRI-II	17.5	126.0	N. Gas	03.05.2006
MENDERES ELEKTRİK GR-I	8.0	56.0	Geothermal	10.05.2006
KASTAMONU ENTEGRE (Balıkesir) GR-I	7.5	54.0	N. Gas	24.05.2006
BOZ ENERJİ GR-I	8.7	70.0	N. Gas	09.06.2006
ADANA ATIK SU ARITMA TESİSİ	0.8	6.0	Biogas	09.06.2006
AMYLUM NİŞASTA (ADANA)	14.3	34.0	N. Gas	09.06.2006
ŞIKMAKAS (Çorlu) GR-I	1.6	13.0	N. Gas	22.06.2006
ELBİSTAN B GR-III	360.0	2,340.0.	Lignite	23.06.2006
ANTALYA ENERJİ GR I-II-III-IV	34.9	245.0	N. Gas	29.06.2006
HAYAT TEM. VE SAĞLIK GR I-II	15.0	108.0	N. Gas	30.06.2006
EKOLOJİK EN. (Kemerburgaz) GR-I	1.0	6.0	Waste Heat	31.07.2006
EROĞLU GİYİM (Çorlu) GR-I	1.2	9.0	N. Gas	01.08.2006
CAM İŞ ELEKTRİK (Mersin) GR-I	126.1	1,008.0.	N. Gas	13.09.2006
ELBİSTAN B GR-II	360.0	2,340.0.	Lignite	17.09.2006
YILDIZ ENT. AĞAÇ (Kocaeli) GR-I	6.2	40.0	N. Gas	21.09.2006
ÇERKEZKÖY ENERJİ GR-I	49.2	390.0	N. Gas	06.10.2006
ENTEK (Köseköy) GR-V	37.0	293.9	N. Gas	03.11.2006
ITC-KA EN. MAMAK TOP.M. GR I-II-III	4.2	30.0	Waste Heat	03.11.2006
ELBİSTAN B GR-IV	360.0	2,340.0.	Lignite	13.11.2006
ÇIRAĞAN SARAYI GR-I	1.3	11.0	N. Gas	01.12.2006
ERTÜRK ELEKTRİK Tepe RES GR-I	0.9	2.0	Wind	22.12.2006
AKMAYA (Lüleburgaz) GR-I	6.9	50.0	N. Gas	23.12.2006
BURGAZ (Lüleburgaz) GR-I	6.9	54.0	N. Gas	23.12.2006
ŞANLIURFA GR I-II	51.8	124.0	Hydro (Run of River)	01.03.2006
BEREKET ENERJİ GÖKYAR HES 3 Grup	11.6	43.3	Hydro (Run of River)	05.05.2006
MOLU EN. Zamantı Bahçelik GR I-II	4.2	16.7	Hydro (Run of River)	31.05.2006
SU ENERJİ (Balıkesir) GR I-II	4.6	20.7	Hydro (Run of River)	27.06.2006
BEREKET EN. (Mentaş Reg) GR I-II	26.6	108.7	Hydro (Run of River)	31.07.2006
EKİN (Başaran Hes) (Nazilli)	0.6	4.5	Hydro (Run of River)	11.08.2006
ERE (Sugözü rg. Kızıldüz hes) GR I-II	15.4	31.6	Hydro (Run of River)	08.09.2006
ERE (AKSU REG. Ve ŞAHMALLAR HES) GR I-II	14.0	26.7	Hydro (Run of River)	16.11.2006
TEKTUĞ (Kalealtı) GR I-II	15.0	52.0	Hydro (Run of River)	30.11.2006
BEREKET EN. (Mentaş Reg) GR III	13.3	54.4	Hydro (Run of River)	13.12.2006
HABAŞ (ALİAĞA-ADDITION)	9.1	35.3	N. Gas	02.05.2007
MODERN ENERJİ	5.2	38.0	N. Gas	2007
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Kadıköy Hast.)	0.5	4.0	N. Gas	19.06.2007
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Kozyatağı Hast.)	0.6	5.0	N. Gas	23.10.2007
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Nilüfer/BURSA)	1.3	11.0	N. Gas	28.08.2007

AKATEKS Tekstil Sanayi ve Ticaret A.Ş.	1.8	14.0	N. Gas	30.07.2007
FLOKSER TEKSTİL SAN.AŞ.(Çatalça/istanbul)	2.1	17.0	N. Gas	03.12.2007
FLOKSER TEKSTİL SAN.AŞ.(Çatalça/istanbul)	2.1	17.0	N. Gas	03.12.2007
FRİTOLAY GIDA SAN.VE TİC. AŞ.	0.5	4.0	N. Gas	23.01.2007
KIVANÇ TEKSTİL SAN.ve TİC.A.Ş.	3.9	33.0	N. Gas	20.03.2007
KİL-SAN KİL SAN.VE TİC. A.Ş	3.2	25.0	N. Gas	19.02.2007
SÜPERBOY BOYA SAN.ve Tic.Ltd.Şti.	1.0	8.0	N. Gas	05.12.2007
SWİSS OTEL (Anadolu Japan Turizm A.Ş (İstanbul)	1.6	11.0	N. Gas	01.08.2007
TAV Esenboğa Yatırım Yapım ve İşetme AŞ.	3.9	33.0	N. Gas	19.09.2007
KARTONSAN	5.0	40.0	Liqued Fuel + N.Gas	2007
ESKİŞEHİR END. ENERJİ	3.5	26.8	Liqued Fuel + N.Gas	2007
İGSAŞ	2.2	15.2	Liqued Fuel + N.Gas	2007
ITC-KA Enerji Üretim Aş.(Mamak)(Addition)	1.4	11.0	Waste Heat	22.05.2007
BİS Enerji Üretim AŞ.(Bursa)(Addition)	43.0	354.8	N. Gas	30.05.2007
Aliağa Çakmaktepe Enerji A.Ş.(Aliağa/İZMİR)	34.8	278.0	N. Gas	13.09.2007
BİS Enerji Üretim AŞ.(Bursa)(Addition)	48.0	396.1	N. Gas	30.08.2007
BOSEN ENERJİ ELEKTRİK AŞ.	142.8	1,071.0.	N. Gas	18.01.2007
SAYENERJİ ELEKTRİK ÜRETİM AŞ. (Kayseri/OSB)	5.9	47.0	N. Gas	03.07.2007
T ENERJİ ÜRETİM AŞ.(İSTANBUL)	1.6	13.0	N. Gas	04.04.2007
ZORLU EN.Kayseri (1 GT Addition)	7.2	55.0	N. Gas	17.01.2007
SİİRT	25.6	190.0	Fuel Oil	2007
Mardin Kızıltepe	34.1	250.0	Fuel Oil	2007
KAREN	24.3	180.0	Fuel Oil	2007
İDİL 2 (PS3 A- 2)	24.4	180.0	Fuel Oil	2007
BORÇKA HES	300.6	1,039.0.	Hydro (With Dam)	27.02.2007
TEKTUĞ(Keban River)	5.0	32.0	Hydro (run of river)	08.05.2007
YPM Ener.Yat.AŞ.(Altıntepe Hydro)	4.0	18.0	Hydro (run of river)	06.06.2007
YPM Ener.Yat.AŞ.(Beypınar Hydro)	3.6	18.0	Hydro (run of river)	06.06.2007
YPM Ener.Yat.AŞ.(Konak Hydro)	4.0	19.0	Hydro (run of river)	19.07.2007
KARASU HES-Andırın	2.4	19.0	Hydro (run of river)	28.11.2007
İSKUR TEKSTİL (SÜLEYMANLI HES)	4.6	18.0	Hydro (run of river)	30.12.2007
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)	6.3	27.0	Hydro (run of river)	03.05.2007
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)(Addition)	6.3	27.0	Hydro (run of river)	24.05.2007
MB ŞEKER NİŞASTA SAN.A.Ş. (Sultanhanı)	8.8	60.0	Natural Gas	2008
AKSA ENERJİ (Antalya)	183.8	1,290.0	Natural Gas	2008
AKSA ENERJİ (Manisa)	52.4	370.0	Natural Gas	2008
ANTALYA ENERJİ (Addition)	17.5	122.3	Natural Gas	2008
ATAÇ İNŞAAT SAN. A.S.B. (ANTALYA)	5.4	37.0	Natural Gas	2008
BAHÇIVAN GIDA (LÜLEBURGAZ)	1.2	8.0	Natural Gas	2008

CAN ENERJİ (Çorlu - Tekirdağ) (Addition)	52.4	304.2	Natural Gas	2008
FOUR SEASONS OTEL (ATİK PASHA TUR. A.Ş.)	1.2	7.0	Natural Gas	2008
FRİTOLAY GIDA SAN.VE TİC. AŞ. (Addition)	0.1	4.0	Natural Gas	2008
ITC-KA Enerji Üretim Aş.(Mamak)(Addition)	14.1	95.8	Waste	2008
KARKEY (SİLOPİ-5) (154 kV) (Addition)	14.8	103.2	Fuel Oil	2008
MELİKE TEKSTİL (GAZİANTEP)	1.6	11.0	Natural Gas	2008
MİSİS APRE TEKSTİL BOYA EN. SAN.	2.0	14.0	Natural Gas	2008
MODERN ENERJİ (LÜLEBURGAZ)	13.4	94.1	Natural Gas	2008
ORTADOĞU ENERJİ (ODA YERİ) (Eyüp/İST.)	2.8	22.0	Waste	2008
POLAT TURZ. (POLAT RENAISSANCE İST. OT.)	1.6	11.0	Natural Gas	2008
SARAYKÖY JEOTERMAL (Denizli)	6.9	50.0	Geothermal	2008
SÖNMEZ Elektrik (Addition)	8.7	67.3	Natural Gas	2008
AKKÖY ENERJİ (AKKÖY I HES)	101.9	408.0	Hydro (with Dam)	2008
ALP ELEKTRİK (TINAZTEPE) ANTALYA	7.7	29.0	Hydro (run of river)	2008
CANSU ELEKTRİK (MURGUL/ARTVİN)	9.2	47.0	Hydro (run of river)	2008
ÇALDERE ELEKT. (ÇALDERE HES) Dalaman - MUĞLA	8.7	35.0	Hydro (run of river)	2008
DAREN HES ELKT. (SEYRANTEPE BARAJI VE HES)	49.7	182.0	Hydro (With Dam)	2008
DEĞİRMENÜSTÜ EN. (KAHRAMANMARAŞ)	25.7	69.0	Hydro (With Dam)	2008
GÖZEDE HES (TEMSA ELEKTRİK) BURSA	2.4	10.0	Hydro (run of river)	2008
H.G.M ENERJİ (KEKLİCEK HES) (Yeşilyurt)	8.7	18.0	Hydro (run of river)	2008
HAMZALI HES (TURKON MNG ELEKTRİK)	16.7	117.0	Hydro (run of river)	2008
HİDRO KNT. (YUKARI MANAHOZ REG. VE HES)	22.4	79.0	Hydro (run of river)	2008
İÇ-EN ELK. (ÇALKIŞLA REGÜLATÖRÜ VE HES)	7.7	18.0	Hydro (run of river)	2008
KALEN ENERJİ (KALEN II REGÜLAT. VE HES)	15.7	50.0	Hydro (run of river)	2008
MARAŞ ENERJİ (FIRNIS REGÜLATÖRÜ VE HES)	7.2	36.0	Hydro (run of river)	2008
SARMAŞIK I HES (FETAŞ FETHİYE ENERJİ)	21.0	96.0	Hydro (run of river)	2008
SARMAŞIK II HES (FETAŞ FETHİYE ENERJİ)	21.6	108.0	Hydro (run of river)	2008
TORUL	105.6	322.0	Hydro (With Dam)	2008
YEŞİL ENERJİ ELEKTRİK (TAYFUN HES)	0.8	5.0	Hydro (run of river)	2008
TOTAL	**6,718.6**	**43,962.3**		

Annex 4

MONITORING INFORMATION

No additional information other than given in B.7