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

Grid-Connected Electricity Generation From Renewable Resources:

ULUABAT
Hydroelectric Power Plant

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Title: ULUABAT HYDROELECTRIC POWER PLANT
Version: 04
Date: 15/10/2010

A.2. Description of the project activity:

Uluabat HEPP and Cinarcik Dam Project is an integrated project located on the lower basin of Orhaneli Creek, one of the major branches of Mustafa Kemalpasa River. It is built within the scope of Emet Orhaneli Project developed by General Directorate of DSI (State Hydraulic Works) for utilizing the water potential in Marmara Region and has two components. First component, Cinarcik Dam is built by DSI mainly for providing agricultural, industrial and drinking water for Bursa city whereas second component, Uluabat HEPP project has been awarded to Akenerji Elektrik Uretim A.S. for 49 years period after the bidding by the Turkish Energy Market Regulatory Authority (EMRA).

Scope of the project is using the hydraulic sources of the Orhaneli Creek for securing long term potable water supply for Bursa city and industrial zone, providing irrigation water for agricultural land and generating electricity to meet the increasing energy demand. The first component of the project , Çınarcık Dam, is built and owned by DSI whereas the Uluabat HEPP will be built and operated by Akenerji for electricity generation using excess water(after securing potable and irrigation water) stored at Çınarcık Dam.

Proposed project is located in Marmara Region of Western Turkey, within the borders of Bursa province and about 55km southwest of the city center. It is surrounded by Nilufer Creek in the East, Emet Creek in the west and Orhaneli District and Buyuk Orhan town in the South.

The project consists of a rock filled embankment dam at 210 meters riverbed elevation, 556 m long horseshoe shaped derivation tunnel, 11,820 m long transmission tunnel, source and downstream cofferdams, spillway, 838 m long penstock pipe and a power plant with 2 vertical axis Francis turbines.

Uluabat HEPP project has installed capacity of 100 MW and expected to generate 422.6 GWh as per the license however due to the use of water for other purposes, it is expected to decrease to 373.03 GWh in 2021 and 323.653 GWh in 2028 in parallel to GWh. For the first crediting period, it has been assumed that average generation will be 422.6GWh and emission reduction has been calculated respectively. Electricity generated by the power plant will be delivered to the grid by an 11.2 km long 154 kV double circuit overhead transmission line.

Main goals of the proposed project include;

- Provide irrigation for the surrounding territories,
- Provide usable and drinking water for the city of Bursa and the Organized Industrial zone

- Utilize the hydroelectric potential of Turkey in the western part of Turkey, in order to meet increasing electricity demand and guarantee the energy security.[1]
- Increase share of HEPPs in electricity generation mix of Turkey and reduce GHG emissions.
- Contribute to economic development by creating direct and indirect job opportunities during construction and operation phases.
- Reduce import dependency on fossil fuel weighed electricity sector and diversify generation mix through use of local resources.

Most of the hydraulic projects in Turkey is located in Fırat Basin or Black Sea region whereas the consumption is concentrated in western part. Implementing the Uluabat HEPP, the demand in western part will be met by generation at the region which will prevent transmission of electricity from eastern regions of Turkey. [1] Compared to existing installed capacity and generation of existing HEPPs, Uluabat HEPP constitutes 1.2% of the electric generation from HEPPs and 0.22% of the total electricity generation of Turkey in 2007[2]. will increase share of , Project will contribute to sustainable development in the region through creating new job opportunities during construction and operational phase. More than 150 people will be employed during construction stage, which shall take about 3 years. Project will also create employment opportunities for about 15 people during operation stage.

Title	Number
Engineer (Plant Manager + Asst. Plant Manager)	2
Technician(Mechanical +Electrical)	8
Security	3
Support Staff	2
Total	**15**

Table 1. Estimated number of people to be recruited during operation phase

In addition to direct and indirect job opportunities, project is also expected to increase income of fishermen in the region, increase the agricultural income of the local community and support the development of the industrial zone of Bursa.

A.3. Project participants:

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
Turkey(Host)	Akenerji Elektrik Üretim AŞ. Global Tan Energy Ltd.	No

[1] http://www.emo.org.tr/ekler/2cc8a94a4f4bf47_ek.pdf?tipi=2&turu=X&sube=7

[2] http://www.teias.gov.tr/ist2007/13.xls

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

The Uluabat HEPP project is located between 28º 46' - 28 º 43' E longitudes and 40º 03' - 40º 09' N latitudes. Nearest settlement to the project site is the Akcalar village, which is about 20 km to the project site. .

A.4.1.1. Host Party(ies):

Although Turkey, the Host Country, passed legislation in Parliament on February 5th 2009 to ratify the Kyoto Protocol - Turkey does not have a quantitative emission reduction limit likely until post 2012 and as such is therefore in the interim period continues to be eligible for voluntary emission reduction projects.

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

Bursa Province

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

Uluabat District,

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

The project site lies between 28º 46' - 28 º 43' E longitudes and 40º 03' - 40º 09' N latitudes. The closest settlement is the Akçalar Village, about 20 km to the project site. Other settlements close to the project site are the towns of Orhaneli and Buyuk Orhan in the south, within the province of Bursa. The project lies between the Emet Creek in the west and Nilufer Creek at the east.

Figure 1. Location of the project site

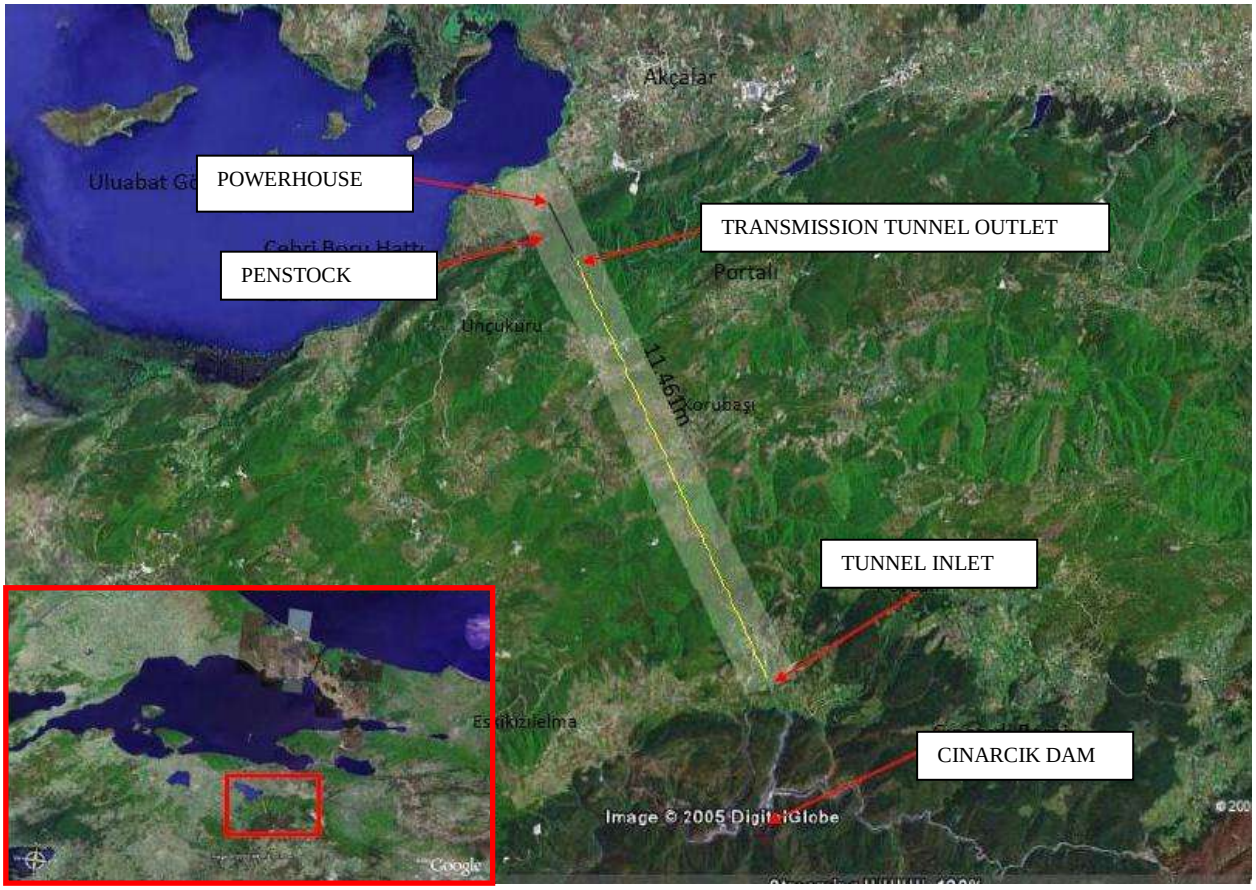

Figure 2. Layout of the project activities

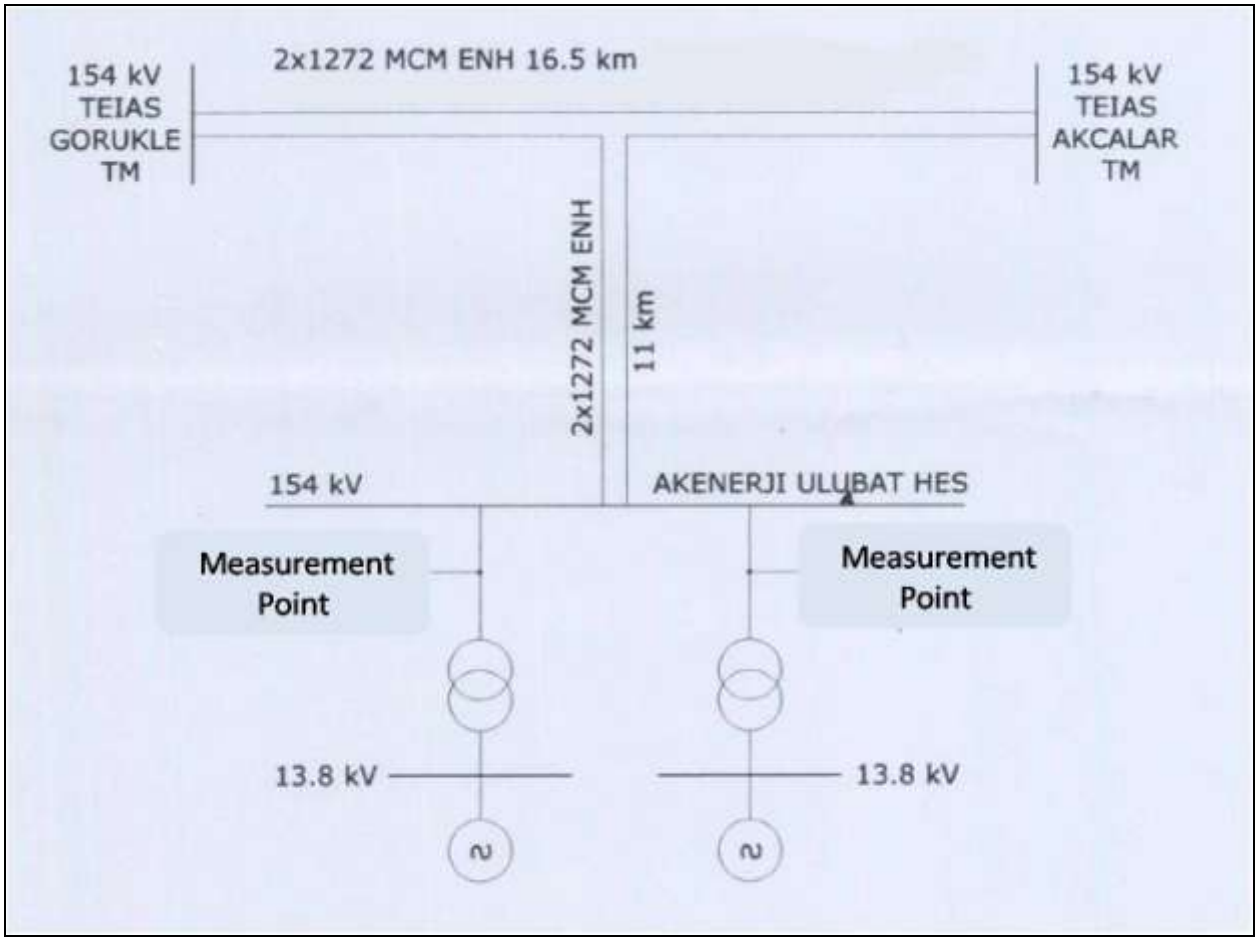

Figure 3. Uluabat HEPP Grid Connection

Uluabat HEPP will be connected to the National Grid through Gorukle –Akcalar Substation through a 11km line that will be built using the same route with existing transmission line and poles.[3]

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

Proposed project activity is a large-scale project activity involves electricity generation from renewable sources therefore it is categorized in the sectoral scope 1 "Energy Industry – Renewable -/Non-renewable Sources" according to the UNFCCC definition[4].

Project consists of a dam and a hydroelectric power plant. Project is not a part of grouped project.

[3] Uluabat HEPP, Grid Connection Agreement

[4] http://cdm.unfccc.int/DOE/scopes.html

Since the project delivers more than 5,000 tons CO2e and less than 1,000,000 tons of CO2e per year, it neither a micro project nor a mega project.

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

Hydroelectric power plants are structures that generate electricity utilizing energy of flowing water. In hydro electric power plants, kinetic energy of the river and elevation difference along the river bed is converted to electrical energy. Water used to produce electricity is fed back to the river after passing through the turbines. ULUABAT HEPP is a dam type project and consists of a dam body, conveying tunnel, penstock, power house and office buildings. . Dam body of the proposed project is being implemented by DSI whereas the power tunnel and powerhouse will be built by Akenerji AŞ. The tunnel will be excavated using a Tunnel Boring Machine (TBM) which is new in terms of application in HEPP construction.

Project consists of two horizontal axes turbines and generators which are used to transform the potential energy of water to mechanical energy at the first stage and later into electrical energy. Other characteristics of the project have been given below.

LOCATION:	ORHANELİ CREEK OF SUSURLUK BASİN
DESIGN DISCHARGE:	40.00 M^3/SEC
LENGTH OF TUNNEL:	11.82 KM
AVERAGE NATURAL FLOW	23.47 M^3/SEC
GROSS HEAD:	325 M
THALWEG LEVEL	333 M
CREST HEIGHT	123.0 M
TOTAL INSTALLED CAPACITY:	100 MW
RESERVOIR VOLUME	186.75 HM^3
MAX. RESERVOIR SURFACE AREA	10.14 KM^2
NUMBER OF UNITS:	2 EACH
DERIVATION TUNNEL	HORSESHOE TYPE, 0.56KM LONG
TURBINE TYPE:	FRANCIS TYPE – HORIZONTAL AXIS
IRRIGATAION LAND	3,000 HA
TOTAL WATER DEMAND	118.25 HM3/YEAR
TURBINE MANUFACTURER:	VOITH-SIEMENS
GENERATOR TYPE:	3 PHASE SYNCRON WİTH 0.975 EFFİCİENCY
LENGTH OF ENERGY TRANSMISSION LINE:	11.00 KM
ENERGY TRANSMISSION LINE CAPACITY:	154 KV
NUMBER OF PENSTOCKS:	2 EACH
LENGTH OF PENSTOCKS:	838 M
AVERAGE ANNUAL POWER GENERATION:	BETWEEN 323.65 AND 422.65 GWH
GRID CONNECTION	THE GRID CONNECTION WAS PROVIDED BY MEANS OF A 11.0 KM LONG 2X1272 MCM ENERGY TRANSMISSION LINE TO THE GORUKLE-AKCALAR TRANSFORMER STATION (154/33 KV) WHICH IS OWNED BY TEIAŞ.

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

Years	Annual estimation of emission reductions in tones of CO_2 e
2010 (01/11/2010– 31/12/2010)	33,245
2011	199,467
2012	199,467
2013	199,467
2014	199,467
2015	199,467
2016	199,467
2017	199,467
2018	199,467
2019	199,467
2020(01/01/2020-31/10/2020)	166,223
Total emission reductions (Tones of CO_2 e)	**1,994,672**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tones of CO_2e)	**199,467**

Table 2. Estimated amount of emission reduction

Project net emission reduction calculation has been based on expected electricity generation, and considering project emissions. The highest risk in achieving the estimated GHG reduction is failure of the project to generate the estimated electricity which may exist either due to decrease in river flow or increase in demand for water for other activities (irrigation, domestic and industrial purposes)

A.4.5. Public funding of the project activity:

No public funding or ODA is used for the project.

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:

The United Nations approved consolidated baseline methodology applicable to this project is ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", Version 10[5].

ACM0002 refers to the following tools:

- "Tool for the demonstration and assessment of additionality", Version 05.2, [6]and
- ''Tool to calculate the emission factor for an electricity system'', Version 01.1[7].

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

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

- Uluabat HEPP project involves installation of a new grid connected renewable electricity generation project,
- The project does not involve switching from fossil fuel use to renewable energy at the site of the project activity; and
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.
- Project results in formation of a new reservoir whose power density is higher than 4 W/m^2

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

- In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 percent between the systems during 60 percent or more of the hours of the year.

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[5] http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_YOYKBRCBIK7TSPSB7MQT75SPX75PE8

[6] http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf

[7] See: http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf

- The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

Since the project output is fed to the Turkish electricity grid which does not involve any distinct electricity systems that applies different price, first criteria defined above is not applicable. Also, since the transmission line between the proposed project and nearest substation is built within the scope of the project and there exist no information on grid capacity utilization, second criteria is also inapplicable. Based on assessment above, it is difficult to conclude with a significant transmission constraint or grid boundary. Since there is no dispatch grid system in Turkey, the project boundary is considered as the National Electricity Grid of Turkey according to applied tool. The geographical and physical boundaries of the Turkish grid and location of the power plants are well identified as given diagram below.

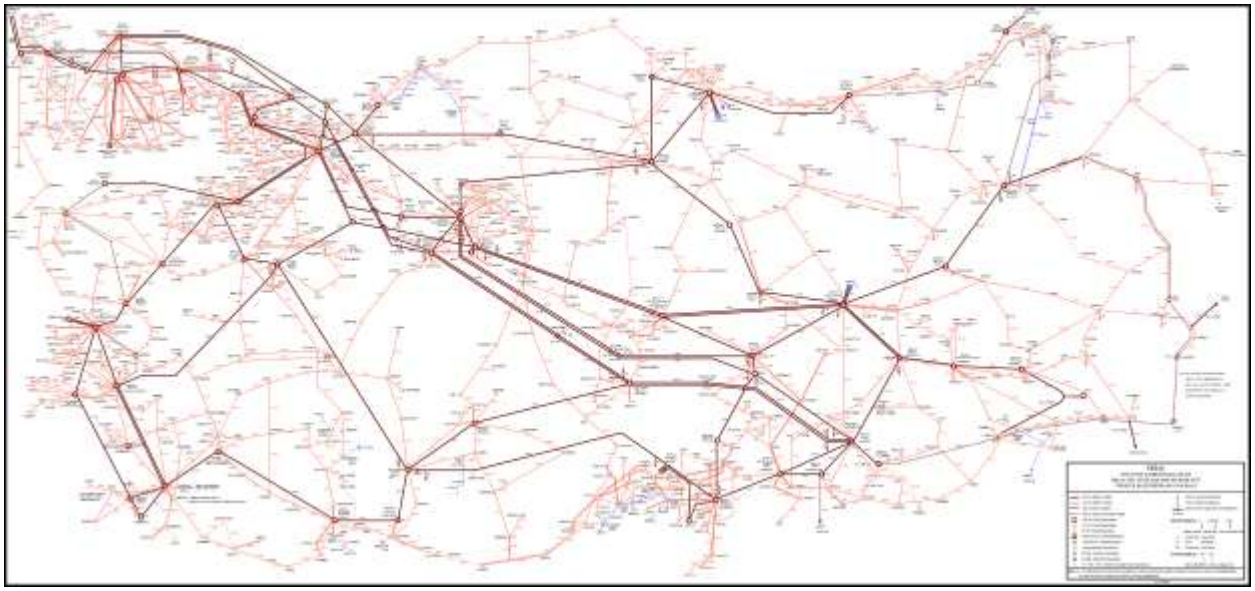

Figure 4. Turkish Electricity Grid

According to the applied methodology, project boundary is defined as "*The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the VER project power plant is connected to*" . For the purpose of calculating build margin and combined margin, national electricity grid of Turkey as given in figure above has been considered.

Project site is surrounded by Emet Creek basin, Nilufer Creek and Orhaneli Districts. Prior to project implementation, several other projects has been planned and implemented by DSI in the same region in order to meet the domestic, agricultural and industrial water demand of Bursa and other settlements in the region. Existing main facilities in the region includes Kayaboğazı Dam which provides water for agricultural and industrial activities, Çavdarhisar Dam for irrigation activities. Total Project site covers about 121,600 m2 land owned by treasury (2.8), individuals (45%) and Directorate of Forestry (%52.2). [8]

Lands impacted by the project activities will be expropriated by the government agencies. Since the Dam is built by DSI already, only impacted part due to electricity generation component of the project will be

[8] Environmental Assessment Report, page 8

powerhouse, switchgear area and transmission line. These lands will also be expropriated by the government agencies as defined by the regulations.

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

GHG gases included in the project boundary and used in calculation of emission reduction by the project activity are given in table below.

	Source	Gas	Included?	Justification/Explanation
Baseline	Electricity generation in baseline (Turkey Grid)	CO_2	Yes	Main Emission Source
		CH_4	No	Minor emission source. Excluded for simplification
		N_2O	No	Minor emission source. Excluded for simplification
Project Activity	Emission from the reservoir of the proposed project	CO_2	Yes	Required by the applied methodology
		CH_4	Yes	Required by the applied methodology
		N_2O	No	Zero-emission electricity generation

Table 3. GHG gases included in the project boundary

The project boundary is limited by the National Electricity Grid of Turkey. The Geographical and physical boundaries of the Turkish grid and location of the power plants are clear. Import data obtained from the relevant government agencies (EUAS- Turkish Electricity Generation Corp., TEIAS – Turkish Electricity Transmission Corp., Ministry of Energy and Natural Resources) have been included in the calculations of the combined margin emissions.

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

This project follows the methodology described in the ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources". Selected methodology has been applied together with the "tool to calculate the emission factor for an electricity system, version 01.1" and "tool for assessment and demonstration of additionality, version 5.2".

The baseline scenario has been identified as "*Electricity delivered to the grid by the project 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"*

Since Turkey is a developing country, there is an increasing demand for electricity which is fully expected to continue in the foreseeable future as shown in figure given. Turkish electricity generation is

mainly composed of thermal power plants[9]. The trend in Turkey to date, given the historically slow development of alternative energy resources, is to build an increasing number of thermal power plants in the future, to cover the annual growth in energy consumption demand. As such, Turkey as an advanced developing nation has to date dealt with energy security by constructing high capacity coal and natural gas power plants. The development of thermal power plants has been also encouraged by the abundance of economically accessible lignite. When we review the licenses issued by the EMRA, we see that total capacity of thermal power plants licensed (by 06/01/2010) is about 51,402 MW whereas for hydro power plants, total installed capacity of licensed plants are 26,794 MW.[10]

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

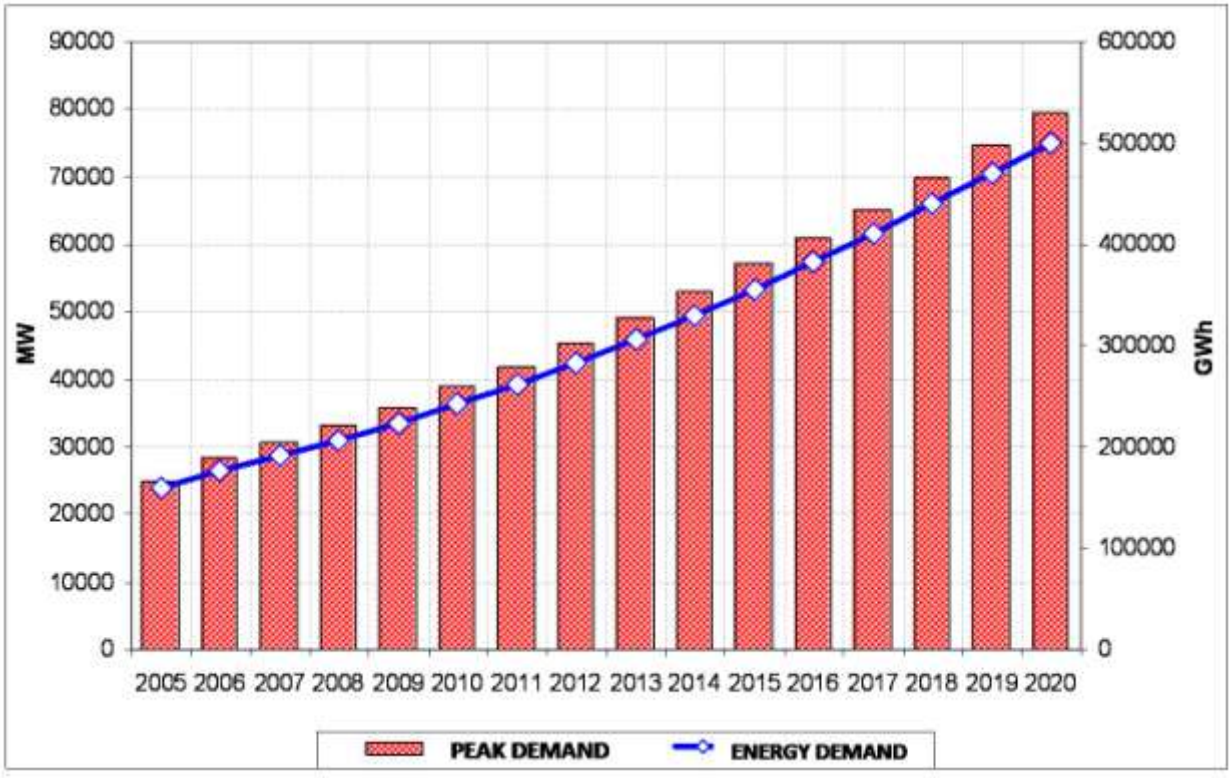

Figure 5. Peak Load and consumption projection for Turkish electricity system between 2005-2020[11]

[9] http://www.teias.gov.tr/istatistik2008/1.xls

[10] http://www.epdk.gov.tr/lisans/elektrik/lisansdatabase/verilentesistipi.asp

[11] http://www.teias.gov.tr/apkuretimplani/veriler.htm

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):

According to the applied methodology (ACM0002) baseline scenario for the project has been defined as "generation of equal amount of electricity by the power plants connected to the grid". Emission factor for the baseline scenario has been calculated according to the combined margin approach as defined by the selected methodology. Within this framework, project is expected to generate about 422.6 GWh of electricity and reduce about 199,467 tCO_2 annually, through replacing the electricity that would need to be supplied via the National grid in the absence of the project activity. Considering the project emissions as calculated in section B.6.3 of this document, net emission reduction of the project will be 259,054 tons CO2 per year. Additionality of the proposed project has been assessed according to the applied tool for demonstration of additionality as shown in following steps.

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

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

Most realistic and reliable alternatives to the project activity are:

1. Proposed project not undertaken as a VER project activity
2. Continuation of current situation and supply of equal amount of electricity by new plants connected to the grid.
3. Construction of a thermal power plant with the same installed capacity or the same annual power output.

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

Last alternative is considered a significant alternative to the project activity since the growth of thermal power plants has increased and is expected to continue to disproportionately increase in the future due to demand for electricity predicted to increase by near 100% from the current level of approximately 40,000 MW to 79,000 MW by year 2020.

Outcome of Step 1a

Three realistic alternatives have been identified for the project scenario as defined above. In the absence of proposed VER activity, most likely scenarios will be

- Supply of electricity by the grid which requires addition of new power plants or ;
- Implementation of a thermal power plant to deliver electricity in order to meet the electricity demand.

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

The following applicable mandatory laws and regulations have been identified:

1. Electricity Market Law[12]
2. Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[13]
3. Energy Efficiency Law [14]
4. Forest Law[15]
5. Environment Law[16]

The resultant alternatives to the project as outlined in Step (1a) are in compliance with the applicable laws and regulations which is assessed by EMRA before issuing license. The generation license for Uluabat HEPP has been issued considering Electricity Law and Law on utilization of Renewable Energy Resources for the purpose of generating electricity energy. The 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 during construction and operational phases as stated in the environmental assessment study 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.

Alternatives to the project activity shall also comply with the relevant regulations as there exist many thermal power plants which are operational already. Also, since there exist many other licensed power plants, including hydroelectric, thermal, geothermal and wind power plants which are expected to commissioned in coming years, it is easily concluded that alternatives are also in compliance with mandatory laws.

Outcome of Step 1b

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

Step 2 - Investment analysis

The investment analysis has been done in order to make an economic and financial evaluation of the project. No public funding or ODA are available in Turkey for finance of this type of projects. Uluabat HEPP has been financed through companies own resources initially whereas several loan agreements for partial funding of the project have been signed after start of construction which have been excluded from the financial analysis as the negotiations with other financiers are continuing. Since the expected generation from the power plant will decrease in time from 422.6 GWh to 323 GWh due to use of water for industrial, domestic and agricultural use in several phases. The expected average generation has been taken as 422.6 GWh during the investment analysis.

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

[13] Law number 5346, enactment date 18/05/2005 http://www.eie.gov.tr/duyurular/YEK/LawonRenewableEnergyReources.pdf

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

[15] Law number 6831, enactment date 31/08/1956

[16] Law number 2872. Published in official gazette No. 18132 on 11/08/'83

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

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

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

Since Project generates economic benefits from sales of electricity, the simple cost analysis is not applicable. Also, since the baseline of the project is generation of electricity by the grid, no alternative investment is considered at issue. So, it has been decided to use benchmark analysis for evaluation of the project investment.

Sub-step 2b. Option III. Apply benchmark Analysis

According to the "Tool for the demonstration and assessment of additionality", a relevant benchmark for an equity IRR can be derived from government bond rates increased by a suitable risk premium (to reflect private investment and/or project type). For benchmark analysis of the project, Eurobond rates obtained from web page of a government) at date of investment decision have been used as given below.

EuroBond	Maturity Date	Currency	Rate
US900123AW05	05.02.2025	USD	7.25

Table 4. Eurobond rate used for the benchmark analysis at time of investment decision[17]

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

Parameters	Unit	Data Value
Installed Capacity	MW	100
Grid Connected output	GWh	422.600
Capital Investment	Million €	139.840
Income tax rate	%	20[18]
Loan	Million €	39.870
Tariff	€ Cents/kWh	5.5[19]
Expected VERs price	€/ tCO_2e	7

Table 5. Main financial parameters used for investment analysis

Equity IRR of Uluabat HEPP has been calculated as 7.46 % based on the parameters given above without considering the carbon revenue. Electricity tariff has been used as €5.5 Cent/kWh although this is the

[17] http://www.ziraat.com.tr/tr/bankamiz/faiz-ve-ucretler/aspx/eurobond.aspx (Accessed on 27/01/2010)

[18] http://www.izmirvdb.gov.tr/down_files/vergi_oranlari.doc (page 4, accessed on 26/01/2010)

[19] Law number 5346, enactment date 18/05/2005 http://www.eie.gov.tr/duyurular/YEK/LawonRenewableEnergyReources.pdf

maximum amount and floor price is €5.0 Cents/kWh as given in renewable energy law. Annual generation has been taken as 422.6 GWh. Contingency has been assumed as about 10% of investment cost calculated at the beginning of the project whereas the investment period is taken as twenty years (including three years construction period). Investment decision date for the project has been selected as date of equipment purchase agreement (07/04/2006). Zero Residual Balance adjustment coefficient has been estimated based on available data at TEIAS[20].Also, as per the agreement, the project owner has agreed to pay a development fee to DSI in 10 installments starting 5 years after commissioning of the plant.

Benchmark value has been derived from the Eurobond rates (7.25%) given above increased by a risk premium of 9.41% for Turkey[21] and calculated as 16.66% which means that equity IRR of the investment should be above this value so that investors takes the incentive to make investment in Turkey. In order to reach the benchmark, average electricity price should be more than 8.5€ so that IRR exceeds 16.66% and investors take the incentive to invest in project.

When we include the carbon revenue in the cash flow, equity IRR increases to 8.97% (for €5.5 cents tariff) and the project becomes more attractive for the investors as coupled with the view that energy sale prices that can be achieved from the project will likely increase in future years and project will be able to generate mainly in peak hours where the tariff is high using the flexibility of storage volume of the plant.

Sub-step 2d - Sensitivity Analysis

Sensitivity analysis has been carried out for three main parameters identified;

- Investment Cost
- Operating Cost
- Electricity Sales revenue

For a range of ±10% fluctuations in main parameters selected according to tool applied, table below has been obtained.

	% Fluctuation						
	-10	**-5**	**-2.5**	**0**	**+2.5**	**+5**	**+10**
Investment Cost	8.82	8.1	7.77	7.46	7.17	6.89	6.38
Operating Cost	7.72	7.59	7.53	7.46	7.4	7.33	7.2
Electricity Income	5.63	6.55	7.01	7.46	7.91	8.35	9.23

Table 6. Sensitivity analysis for Uluabat HEPP project (without carbon revenue)

Outcome of Step 2:

[20] http://pmum.teias.gov.tr/UzlasmaWeb/unLogedIn/DUYRapor.First

[21] http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem06.xls (accessed on 19/02/2010)

The investment and sensitivity analysis shows that the VER revenues will improve the financial indicators of the project and make the project more attractive for investors and funding institutions. Considering that figures above are based on highest governmental guarantee price rather than average price, optimistic estimations for yearly generation and that those figures do not reflect the risk for investment, role of carbon income is a most significant number to enable the project to proceed and favorable investment and funding decision taken.

For Uluabat HEPP, in order to reach minimum attractive IRR values, average electricity tariff must be around 8.5€c/kWh so that the investment will become reasonable. Considering that control of hydroelectric power plants on generation is limited due to fluctuations on utilization of installed capacity**Hata! Yer işareti tanımlanmamış.**' **Hata! Yer işareti tanımlanmamış.** expectation that the floor electricity prices will increase is the risk for investors whereas realization of this expectation will increase the premium. Carbon revenue has a significant affect in this respect in terms of decreasing the period for return on investment and minimizing investment risk.

Based on the analysis and information above, it is concluded that project is not the most attractive option considering alternative investment opportunities. Therefore project is considered as additional to the baseline scenario.

Step 3. Barrier analysis

This step is skipped as the additionality is demonstrated in previous step.

Step 4. Common Practice Analysis

Sub-step 4a. Analysis of other activities similar to the proposed project activity

According to the TEIAS statistics[22], share of HEPPs in total installed capacity of Turkey is about 32.8% whereas share of HEPPs in total generation is only 18.7% which shows that capacity use ratio of hydropower plants are much lower than thermal power plants. As the grid fee paid is calculated based on installed capacity[23], this provides a disadvantage for hydroelectric power plants. However, when we examine the historical data, it is observed that total installed capacity of thermal power plants has shown a rapid growth in parallel with the demand for electricity whereas hydroelectric power generation has grown at a far slower rate - the energy generation proportion decreasing from 40% historically to the current levels as shown in the figure below [24,25].

[22] http://www.teias.gov.tr/ist2007/13.xls

[23] http://www.epdk.gov.tr/tarife/elektrik/iletim/2360/2360.doc

[24] http://www.teias.gov.tr/ist2007/32.xls

[25] IEA Turkey Country Report, 2005

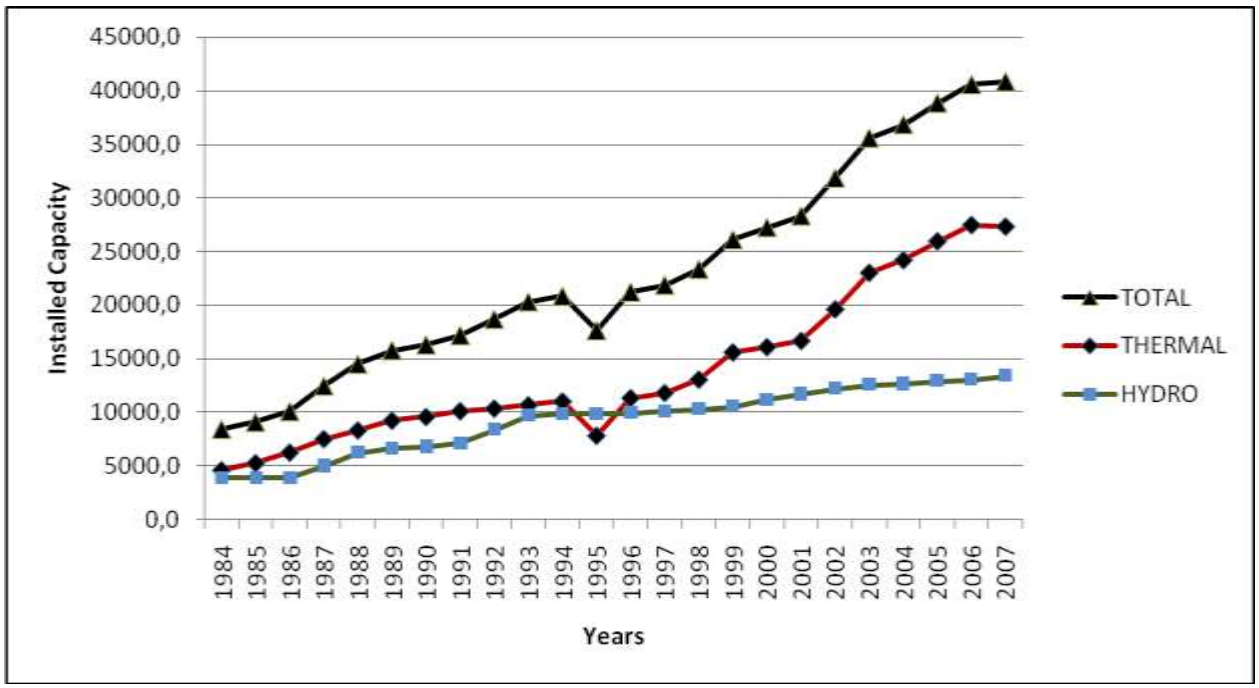

Figure 6. Annual Development of Turkey's Installed Capacity

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

The main reason behind the decrease in share of hydro electricity power is due to the changes in government's economic policy which intends to encourage private companies to invest in energy generation and lower the weight of government on energy generation as a part of privatization efforts. On the other hand, private companies have mainly preferred to invest in thermal power plants which can be commissioned in shorter time periods, require lower initial investment and uses conventional technologies. Installed capacity of thermal power plants owned by generation companies has increased from 123.4 MW in 1996 to 10,688.8 MW in 2007 whereas the total capacity of hydro electricity power plants has only increased from 75.3 MW to 1,345 MW(including autoproducers, generation companies, Build-Operate-Transfer(BOT)plants and concessionary companies) in the same period which show that private companies find more attractive to invest is thermal power plants[26,27,28].

When we look at the distribution of hydro power capacity by utilities, it is seen that total generation capacity of the hydroelectric power plants owned by generation companies is 1,503 GWh by end of 2007[29] which corresponds to 0.78% of the total generation capacity(191,558.1 GWh) of Turkey at that time. However, a detailed review of these has shown that majority of these plants have been initially

[26] http://www.teias.gov.tr/ist2007/5(1984-05).xls

[27] http://www.teias.gov.tr/ist2006/8.xls

[28] http://www.teias.gov.tr/ist2007/8.xls

[29] http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2008.pdf (page 120)

licensed/implemented as Autoproducer or BOT power plants but later licenses have been revised as Generation Company License during liberalization of Turkish Electricity Market and some of them have been built using VER revenue (See Annex 9 for details). When these plants are excluded, the sum of remaining power plants corresponds to about 0.03% of total generation capacity by 2007.

Besides the fact that each project is different and has unique characteristics, information (Investment Model, incentives, investment&finance cost or IRR) about these plants is not publicly available. Therefore a reliable comparison of these plants would not result in a reliable outcome. Figure below demonstrates that recently built hydroelectric power plants are not as efficient as the previous ones and serve as a good example to the point issued in previous statement. The figure also shows the fluctuation in electricity generation which poses high investment risk especially for run-off-river type hepps.

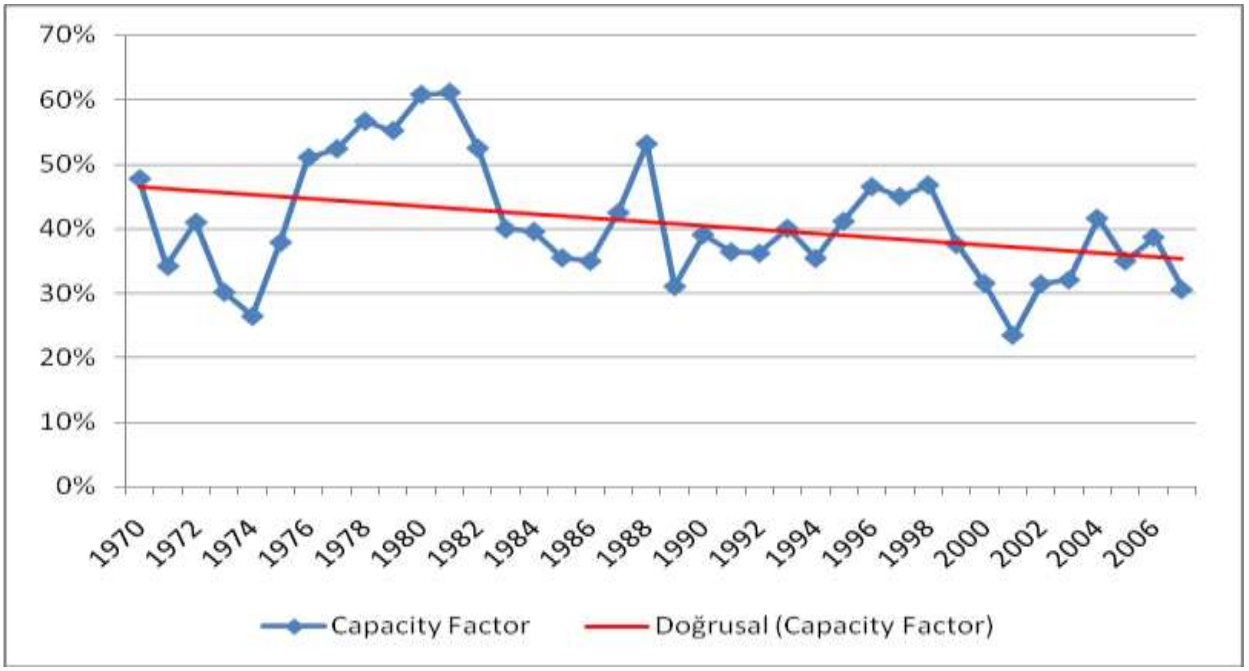

Figure 5. Evolution of Capacity(Plant Load) Factor of HEPPs in Turkey. Hata! Yer işareti tanımlanmamış.'Hata! Yer işareti tanımlanmamış.

Outcome of Step 4:

Given the past and continuing weight and presence of government influence, as mentioned and illustrated from the above facts, it seen clearly seen that there exists n o similar activity in the region implemented without considering carbon revenue. Also, considering that most of the existing HEPP projects have been built by public agencies and weight of hydropower plants in Turkey's installed capacity is decreasing, it is concluded that proposed project is not considered as a common practice.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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

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

The additionality assessment of the project activity has been demonstrated using the latest version of the 'Tool for assessment and demonstration of additionality'.

According the "Tool to calculate the emission factor for an electricity system", ver. 01.1, the following four methods are applicable to calculate the operating margin:

a) Simple OM,
b) Simple adjusted OM,
c) Dispatch Data Analysis OM and
d) Average OM.

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

		2007	2006	2005	2004	2003	Average
Total Generation	**[GWh]**	191,558	176,300	161,956	150,698	140,581	164,219
Low-cost / must run	**[GWh]**	36,362	44,465	39,714	46,235	35,480	39,309
Low-cost / must run	**[%]**	19	25	25	31	25	25

Table 7. Breakdown by source of electricity generation for the five most recent years[30]

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

Data / Parameter:	**$EG_{y, Total}$**
Data unit:	MWh
Description:	Net Electricity generated by power plants in Turkey in year 2007,2006 and 2005
Source of data used:	TEIAS web page (http://www.teias.gov.tr/ist2007/30(84-07).xls)
Value applied:	183,339.7 GWh
Justification of the	Data used for emission reduction calculation(for calculation of OM, Net-to-

[30] http://www.teias.gov.tr/ist2007/13.xls

choice of data or description of measurement methods and procedures actually applied :	Gross electricity ratio and share of low-cost must-run sources)
Any comment:	

Data / Parameter:	**$EF_{CO2, i, y i}$**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor of fossil fuel type "i" in year "y"
Source of data used:	-For EF of fossil fuels, IPCC values at the lower limit has been used.
Value applied:	**Fuel Source** / **EF(tCO2/Tj)** Coal 89.50 Lignite 90.9 Fuel Oil 75.5 Diesel 72.6 LPG 61.6 Naphta 69.3 Natural Gas 54.3
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ACM0002, IPCC default values at lower limit of 95% confidence interval can be used. Although, the actual emission reduction is expected to be higher due to high EF of fuels consumed in existing power plants, IPCC values have been used for conservativeness as requested by the methodology.
Any comment:	

Data / Parameter:	**$FC_{i, y}$**
Data unit:	Tons or 1000 m^3 for gases
Description:	Amount of fuels consumed by thermal power plants for electricity generation in terms of fossil fuel type i in year y
Source of data used:	TEIAS web page (http://www.teias.gov.tr/ist2007/42.xls; http://www.teias.gov.tr/ist2007/43.xls)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually	Data used for OM calculation

applied :	

Data / Parameter:	**GE**
Data unit:	%
Description:	Generation efficiency of thermal power plants
Source of data used:	Annex I of tool applied
Value applied:	Given in table in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used for BM calculation
Any comment:	

Data / Parameter:	**NCV**
Data unit:	Tj/kt
Description:	Net Calorific Values of Fuel combusted in power plants.
Source of data used:	TEIAS web page (http://www.teias.gov.tr/ist2007/45.xls)
Value applied:	Given in table in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used for OM and BM calculation
Any comment:	

Data / Parameter:	Cap_{BL}
Data unit:	W
Description:	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero
Source of data:	Project site
Measurement procedures (if any):	Determine the installed capacity based on recognized standards
Any comment:	-

Data / Parameter:	A_{BL}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.
Source of data:	Project site

Measurement procedures (if any):	Measured from topographical surveys, maps, satellite pictures, etc.
Any comment:	-

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

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

Step 1. Identification of the relevant electrical power system

According to the ''Tool to calculate the emission factor for an electricity system'', a project electricity system has to be defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity, and that can be dispatched without significant transmission constraints. Therefore, in this project activity the project electricity system includes the project site and all power plants attached to the Interconnected Turkish National Grid, which has an installed capacity of 40,835.7MW and gross generation about 191,558.1 by 2007[31,32].

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

Step 2. Select an operating margin method

The Simple Operating Margin (OM) emission factor ($\mathbf{EF}_{grid, OM, y}$) is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all the generating plants serving the system, excluding low-cost/must-run power plants. As electricity generation from solar and low cost biomass facilities is insignificant and there are no nuclear plants in Turkey, the only low cost /must run plants considered are hydroelectric, wind and geothermal facilities.

The tool gives two options for the calculation of $\mathbf{EF}_{grid, OM, y}$;

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

For this project the *ex-ante* approach is selected. Data for calculating the three year average is obtained from the period 2005 – 2007, the most recent data available at the time of PDD submission to the DOE.

Step 3. Calculating the operating margin emission factor according to the selected method.

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31 http://www.teias.gov.tr/ist2007/1.xls

32 http://www.teias.gov.tr/ist2007/13.xls

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

- Based on fuel consumption and net electricity generation data of each power plant / unit (Option A), or
- Based on net electricity generation data, the average efficiency of each power unit, and the fuel type (s) used in each power unit (Option B), or
- Based on total net electricity generation data of all power plants serving the system, fuel types, and total fuel consumption of the project electricity system (Option C)

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

(1)

where:

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

For the calculation of the Simple OM, the amount of fuel consumption ($FC_{i, y}$) and heating values of fuels are taken from website of TEIAS[33,34,35,36], the official source of related data. Fuel consumption values for the relevant years are given in table below:

[33] http://www.teias.gov.tr/ist2007/42.xls

[34] http://www.teias.gov.tr/ist2007/43.xls

	$FC_{i,y}$ unit [Ton, except for Natural Gas (NG) (1000 m^3)]			
Fuel Type	**2007**	**2006**	**2005**	**Total**
Hard Coal	6,029,143	5,617,863	5,259,058	16,906,064
Lignite	61,223,821	50,583,810	48,319,143	160,126,774
Fuel Oil	2,250,686	1,746,370	2,005,899	6,002,955
Diesel Oil	50,233	61,501	28,442	140,176
LPG	0	33	12,908	12,941
Naphtha	11,441	13,453	84,481	109,375
Natural Gas	20,457,793	17,034,548	15,756,764	53,249,105

Table 8. Fuel Consumption in thermal power plants

The NCV of the fuels consumed have been calculated using data from the TEIAS web page. The emission factors required for calculation of CO_2 emission coefficient have been obtained through IPCC 2006 guidelines for GHG inventories for fuels. Details of the data used for the calculations are given in Annex 3.

	COEF (tCO_2/kt)	**Consumption (2005 - 2007)** (tons or $1000m^3$)	**Total Emission (2005 - 2007) (tCO_2)**
Coal	1,954	16,906,064	33,032,943
Lignite	601	160,126,774	96,197,334
Fuel Oil	3,026	6,002,955	18,165,198
Diesel Oil	3,112	140,176	436,185
LPG	2,830	12,941	36,623
Naphtha	3,061	109,375	334,828
Natural Gas	2,003	53,249,105	106,643,758
Total Emissions			**254,846,869**

Table 9. Calculation of emission factors for fuels

Net electricity generated and supplied to the grid by thermal plants has been calculated using data obtained from the TEIAS web page[37,38,39,40]. The ratio between gross and net generation has been

35 http://www.teias.gov.tr/ist2007/44.xls

36 http://www.teias.gov.tr/ist2007/45.xls

37 http://www.teias.gov.tr/ist2007/35(2001-2005).xls

38 http://www.teias.gov.tr/istatistik2007/36(06-07).xls

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

Year	Gross Generation	Net Generation	Net/Gross	Gross Gen. Thermal	Net Gen Thermal	Import	Total Supply to the grid
2005	161,956	155,469	0.960	122,242	117,346	636	117,982
2006	176,299	169,543	0.962	131,835	126,783	573	127,356
2007	191,558	183,340	0.957	155,195	148,537	864	149,401
			Total Net Thermal Gen.		**392,665**	**2,073**	**394,739**

Table 10. Gross/Net electricity generation by Turkish Grid

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

$\mathbf{EF}_{grid,\ OM,\ y}$ = 254,846,869 tCO_2 / 394,739 GWh

= 646 tCO_2/GWh.

Step 4. Identifying the cohort of the power units to be included in the build margin.

The sample group of power units (m) used to calculate the build margin consists of whichever is larger of:

a) The set of five power units that have been built most recently, and
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[41].

Option (b) has been chosen to identify this cohort of power units to be included in the build margin, since it is larger (in terms of power generation) than the result of (a).

The list of the most recent capacity additions to the grid and their average and actual generation capacities are available at the TEIAS web page [42,43,44,45,46][47]. For determination of plants that comprise 20% of the

39 http://www.teias.gov.tr/ist2007/35(2001-2005).xls

40 http://www.teias.gov.tr/istatistik2007/35.xls

41 If 20% falls on part capacity of a unit, that unit is fully included in the calculation

42 http://www.teias.gov.tr/istat2004/7.xls
43 http://www.teias.gov.tr/istatistik2005/7.xls
44 http://www.teias.gov.tr/ist2006/8.xls
45 http://www.teias.gov.tr/ist2007/8.xls

46 http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202007.pdf

system's generation, gross generation in year 2007 which is 191,558.1 GWh has been taken as reference and its 20% has been determined as about 38,311.6 GWh. Since 20% of the most recent year's generation (38,311.6 GWh) falls partly on capacity of a power plant, this plant was fully included in the calculations as requested by the methodological tool applied. Thus, total capacity included in BM calculation has increased to 41,056 GWh which reduces again to 40,519.3 GWh after excluding plants benefitting from VER revenue.

Step 5. Calculate the build margin emission factor

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

$$\mathbf{EF}_{grid,\ BM,\ y} = \sum \mathbf{EG}_{,m,y} \,.\, \mathbf{EF}_{EL,m,y} / \sum \mathbf{EG}_{,m,y} \qquad \textbf{(2)}$$

Where:

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

"Tool to Calculate the Emission Factor for an Electricity System" has been used for plant efficiency data although this approach is very conservative. Since tool does not contain any specific data for plants with LPG, Naphta etc. all of the plants consuming liquid fuels have been considered as open cycle plants. Plants using lignite and coal have been assumed as suing subcritical technology, whereas natural gas plants have been assumed as combined cycle plants. The assumptions have been based on TEIAS statistics which gives heating values of fuels consumed in thermal power plants[48,49] and corresponding electricity generation[50, 51] which shows that values used are very conservative compared to actual situation.

Plant efficiency data has For EF values of fuels consumed, IPCC values at lower limit of 95% confidence interval has been used as requested by applied methodology.

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47 http://www.teias.gov.tr/projeksiyon/CAPACITY%20PROJECTION%202008-2017.pdf

48 http://www.teias.gov.tr/ist2007/45.xls

49 http://www.teias.gov.tr/ist2007/45.xls

50 http://www.teias.gov.tr/ist2007/36(06-07).xls

51 http://www.teias.gov.tr/ist2007/35(2001-2005).xls

	EF CO_2 (tCO2/Tj)	Generation Efficiency	EF (tCO_2/MWh)
Coal	89.5	39.0%	0.826
Lignite	90.9	39.0%	0.839
Fuel Oil	75.5	39.5%	0.688
Diesel	72.6	39.5%	0.662
LPG	61.6	39.5%	0.561
Naphtha	69.3	39.5%	0.632
Natural Gas	54.3	60.0%	0.326

Table 11. Calculation of emission factor from most recent power plants

The build margin emission factor has been determined for the most recent capacity additions as shown in table below. For electricity generation from renewables and solid wastes, the emission factors have been taken as being "zero" since data is not available and the contribution of these plants is insignificant. The Build margin emission factor in the last column has been determined by multiplying each EF value with the corresponding electricity generation value for that fuel and dividing it by the total generation by the most recent capacity additions.

Fuel Source	Generation (MWh)	Percent Generation	EF	Weighted EF
Coal	1,463	3.6%	0.826	0.03
Lignite	11,482	28.0%	0.839	0.23
Fuel Oil	675	1.6%	0.688	0.01
Diesel oil	2	0.0%	0.662	0.00
LPG	50	0.1%	0.561	0.00
Naphtha	323	0.8%	0.632	0.00
Natural Gas	23,974	58.4%	0.326	0.19
Renewable and wastes	85	0.2%	0.000	0.00
Solid	5	0.0%	0.000	0.00
Total Renewable	2,999	7.3%	0.000	0.00
TOTAL Capacity additions	41,056.3	100.0%		

Table 12. Most recent capacity additions corresponding to 20% by fuel source

From the list of the plants included in BM calculation, those built using VER revenue has been excluded as per the tool.

PROJECT	TYPE	INSTALLED CAPACITY (MW)	GENERATION CAPACITY (GWh)	STANDARD
ANEMON	WPP	30.4	92	GS
BARES	WPP	30.0	105	VER+
DOGAL ENERJI(BURGAZ)	WPP	14.9	48	GS

KARAKURT	WPP	10.8	28	GS
MARE MANASTIR	WPP	39.2	129	GS
KARGILIK	HEPP	23.9	83	VCS
KALEALTI	HEPP	15.0	52	VCS
Total		**164,2**	**537**	

Table 13. List of plants identified as VER projects

Source: http://www.markitenvironmental.com and http://cdmgoldstandard.org

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

$\mathbf{EF}_{grid,\ BM,\ y}$ = 19,350 tCO_2 / (41,056.3-537) GWh
= 478 tCO_2/GWh.

STEP 6 - Calculate the combined margin emission factor

Based on ACM0002, weighted average baseline emission factor is calculated as follows;

$$\mathbf{EF}_{grid,\ CM,\ y} = \mathbf{w}_{OM} * \mathbf{EF}_{grid,\ OM,\ y} + \mathbf{w}_{BM} * \mathbf{EF}_{grid,\ BM,\ y} \quad \textbf{(3)}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh) as calculated from equation (12) above.

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

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

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

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

Based on the formula above, baseline emission factor is calculated as;

$$\mathbf{EF}_{grid,\ CM,\ y} = 0.5 * 646 + 0.5 * 478 = \mathbf{562}$$

The combined margin emission factor is therefore **562 tCO_2/GWh.** Emission factor will remain same during the first crediting period as.

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

$$\mathbf{ER_y = BE_y - PE_y - LE_y} \quad \textbf{(4)}$$

Where:

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

Baseline emissions

Baseline emission is calculated according to the formula

$$\mathbf{BE_y = EG_y \times EF_y} \quad \textbf{(5)}$$

Where:

EGy = Net electricity delivered to the grid by the project activity in year y excluding transmission losses of the grid.

EFy = Emission factor calculated according to selected methodology

Project emissions

The proposed project activity involves the generation of electricity by a hydroelectric power plant which has power density higher than $4W/m^2$ and lower than 10 W/m^2 therefore emissions from reservoir is included as per the applied methodology.

The power density of the project activity (PD) is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD = Power density of the project activity (W/m^2)
Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero
A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m2). For new

reservoirs, this value is zero

For Uluabat HEPP,

Cap_{PJ} = 10,000,000 W[52]
Cap_{BL} = 0.0 W
A_{PJ} = 10.140,000 (m^2)[53]
A_{BL} = 0.0 (m^2)

Therefore PD is calculated as ;

$$PD = \frac{100000000 - 0}{10140000 - 0}$$

$$PD = 9.86\ W/m^2$$

As the reservoir emissions for HEPPs having power density between 4 and 10W/m2 is calculated as

$$PE_{HP,y} = \frac{EF_{Res} \cdot TEG_y}{1000}$$

Where:

$PE_{HP,y}$ = Project emissions from water reservoirs (tCO_2e/yr)
EF_{Res} = Default emission factor for emissions from reservoirs of hydro power plants in year *y* ($kgCO_2e/MWh$)
TEG_y = Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y* (MWh)

Default emission factor is taken as 90kg/MWh as per the tool, therefore for Uluabat HEPP total maximum reservoir emissions will be

PE_{HP} = 90*422,600/1000 = 38,034 tCO2/yr = 38.03 $ktCO_2$ for 422.6 GWh annual generation.

Since the power density is calculated based on maximum surface area, considering that the surface reservoir will not operate at maximum level and surface area continuously and that average generation will be lower, corresponding project emission should be lower. However, for conservativeness purposes maximum project emission has been taken into account.

Leakage

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

[52] Generation License

[53] Feasibility Report, Page 4-22.

$$LE_y = 0$$

As a result: Total Emission Reduction is;

$$ERy = BE\ y - COEFi,y$$

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

Years	Estimation of Project Activity Emissions in tones of CO_2 e	Estimation of Baseline emissions in tones of CO_2 e	Estimation of Leakage in tones of CO_2 e	Estimation of Overall Emission Reductions in tones of CO_2e
2010 (01/11–31.12)	6,339	39,584	0	33,245
2011	38,034	237,501	0	199,467
2012	38,034	237,501	0	199,467
2013	38,034	237,501	0	199,467
2014	38,034	237,501	0	199,467
2015	38,034	237,501	0	199,467
2016	38,034	237,501	0	199,467
2017	38,034	237,501	0	199,467
2018	38,034	237,501	0	199,467
2019	38,034	237,501	0	199,467
2020(01/01-31/10)	31,695	197,917	0	166,222
Total	380,340	2,375,010	0	1,994,670

Table 14. Estimated emission reduction by the proposed project

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

Monitoring plan has been applied according to the selected methodology (ACM0002). According to the applied methodology, all data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data will be monitored if not indicated otherwise in the tables below. All measurements will be conducted with calibrated measurement equipment according to relevant standards.

Data / Parameter:	**$EG_{facility, y}$**
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data to be used:	Metering devices used in power plants, monthly records signed by TEİAŞ and plants manager and invoices will be used.
Value of data applied for the purpose of	Estimated annual generation forming the basis for emission reduction calculation is 422.6 GWh

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Generation data will be recorded by two metering devices continuously. These records will provide the data for the monthly invoicing to TEIAS. Each month, an officer from TEIAŞ and the plant manager/electricity technician of the plant will record the reading and sign. This record will form the basis for monthly invoicing.
QA/QC procedures to be applied:	Two calibrated ammeters will backup each other. Maintenance and calibration of the metering devices will be made by TEIAS periodically. If there is a noticeable difference between the readings of two devices, maintenance and tests of the metering devices and the associated equipment will be done before waiting for the periodical maintenance.
Any comment:	

Data / Parameter:	**$PE_{FF,y}$**
Data unit:	tCO_2/yr
Description:	Project emissions from fossil fuel consumption in year *y*
Source of data to be used:	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
Measurement Procedure	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
Monitoring Frequency	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
QA/QC procedures to be applied:	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
Any comment:	-

Data / Parameter:	Cap_{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data to be used:	Project site
Measurement Procedure	Determine the installed capacity based on recognized standards
Monitoring Frequency	Yearly
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	A_{PJ}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full

Source of data to be used:	Project site
Measurement Procedure	Measured from topographical surveys, maps, satellite pictures, etc
Monitoring Frequency	Yearly
QA/QC procedures to be applied:	-
Any comment:	Maximum area is already calculated in feasibility report and considered in calculations. Annual measurements is not expected to be higher than this value.

B.7.2. Description of the monitoring plan:

Monitoring is a key procedure to verify the real and measurable emission reductions from the proposed project. To guarantee the proposed project's real, measurable and long-term GHG emission reductions, the monitoring plan is established.
In order to demonstrate the emission reduction, only the required data is the net electricity delivered to the grid by the project activity.

Net electricity generation will be measured and recorded by both TEIAS and project owners for billing purposes therefore no new additional protocol will be needed monitoring emission reduction. Power Plant Manager, will be responsible for the electricity generated, gathering all relevant data and keeping the records. He will be informed about VER concepts and mechanisms and how to monitor and collect the data which will be used for emission reduction calculations.

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

VER Team Members is expected to include the following staff of the HEPP:
Plant Manager: Responsibility for running the HEPP plant and compliance with VER monitoring plan
Electrical Engineer: Responsible for day electrical operations and recording and monitoring of relevant data and periodic reporting
Accounting Manager: Responsible for keeping data about power sales, invoicing and purchasing.
and
Global Tan Energy: Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

Installation of meter and data monitoring will be carried out according to the regulations by TEIAS. Two metering devices (one of them used as spare) will be used for monitoring the electricity generated by the power plant. Readings will be done using main metering devices and spare metering device will be used for comparison only. Data from metering devices will be recorded by TEIAS monthly and will form the basis for invoicing. In addition to the two metering devices, generation of the HEPP can be cross checked from TEIAS – PMUM web site (http://pmum.teias.gov.tr) which is accessible using a password provided to electricity generation companies. Since the data in PMUM web page will show the net electricity

generated less transmission loss, in order to match the data, the figures taken from PMUM web site must be multiplied by transmission loss factor of the grid.

The net electricity fed to the grid will be measured continuously and recorded monthly by the TEIAS and plant staff. For consistency, recorded data will be compared with electricity sale receipts.

Calibration of the metering devices will be made by TEIAS and sealed before the commissioning of the power plant. The meters will be calibrated by TEIAS when there is an inconsistency between two devices.

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):

Baseline Calculated By:
Mehmet Kemal Demirkol -
Global Tan Energy Limited (GTE- http://www.gte.uk.com)
Telephone: +90 312 472 35 000
Fax: +90 312 472 33 66
E-mail: kemal@gte.uk.com

Monitoring Methodology Developed Jointly By:
Mehmet Kemal Demirkol and Ferit Arsan
Global Tan Energy Limited (GTE)
http://www.gte.uk.com
Telephone: +90 312 472 35 00
Fax: +90 232 472 33 66
E-mail: ferit@gte.uk.com

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:

Project construction has started in 01/04/2006. Project is expected to start operation by 01/11/2010.

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

The expected operational lifetime of the project is about 45 years as per the license issued. After this period, project will be delivered to government authority at no cost.

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

Renewable crediting period is chosen for the project activity.

C.2.1. Renewable crediting period:

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

The crediting period is expected to start in 01/11/2010.

C.2.1.2. Length of the first crediting period:

First Crediting period will have a length of 10 years.

SECTION D. Environmental impacts

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

Uluabat HEPP and Cinarcik Dam Project have been exempt from the procedure of preparation of an Environmental Impact Assessment Report in 2002, since the project approval date is before 1993. However an Environmental Assessment Report was prepared by PRD Planlama, Arastırma, and Gelistirme ve Danısmanlık Sti. In March 2006, in order to evaluate the possible impacts of the Project on the environment and take the necessary steps to mitigate the possible negative impacts.

EIA report prepared for the project covers all aspects of the project including capacity, interaction with other plants in the vicinity, natural resources used, waste management, social and economical impacts, technology and materials used, current land use in the region, any historical or protected site within the project boundaries, geological assessment of the project site and any communities affected with the project. [54]The project does not have significant environmental effects and environmental assessment is positive for the project activities.

After evaluation of the environmental impacts of the 11 km long electrical transmission line and the renewal of the existing 15 km transmission line, Ministry of Environment and Forestry have declared that Environmental impact Assessment Report is not required for the transmission lines. The respective statements are given in Appendix 6.

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:

It shall not have any negative effects on the environment because it shall be operated based on national and international regulations. The HEPP will not change any water volume or cause any water pollution. Water shall be released to the river bed for the Mustafa Kemal Pasa creek. There is some existing small and big creeks feeding the Mustafa Kemal Pasa Creek so that any bib changes in irrigation and the structure of natural life will not occur. The environmental impacts of the proposed project are not considered to be significant. All necessary permissions including, environmental, health and safety, have been acquired from relevant agencies and all precautions have been applied strictly by Investor Company.

SECTION E. Stakeholders' comments

[54] Uluabat HEPP, Environmental Assessment Report, Section E.1(p 83-85, 93-94, 99) and E.2 (p 100-101)

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

Initial Stakeholder meeting of the project was held on 4th of December, 2008 in Akcalar village, in Bursa. Stakeholders were invited through invitation letters sent by mail, newspaper announcements and thorough village heads.

Since Turkey had not then ratified Kyoto Protocol there was no official DNA in the country. However, as the most relevant government agencies, Ministry of Environment and Forestry and Ministry of Energy and Natural Resources were invited. In addition to local and national authorities, local and national NGOs and were also invited and informed about the meeting by mail.

DUYURU

GÖNÜLLÜ ANLAŞMALAR ÇERÇEVESİNDE KARBON TİCARETİ SERTİFİKALANDIRILMASINA YÖNELİK OLARAK, AKENERJİ ELEKTRİK ÜRETİM A.Ş. TARAFINDAN YÜRÜTÜLEN ULUABAT KUVVET TÜNELİ VE HİDROELEKTRİK SANTRALİNE İLİŞKİN PAYDAŞLAR TOPLANTISI 4 ARALIK 2008 TARİHİNDE GERÇEKLEŞTİRİLECEKTİR.
TOPLANTIYA İLİŞKİN DETAYLAR VE TOPLANTI PROGRAMI AŞAĞIDA BİLGİLERİNİZE SUNULMUŞTUR. İLGİLİ KİŞİLERİN TOPLANTIMIZA KATILMALARI BİZLERİ MEMNUN EDECEKTİR.

Paydaşlar Toplantısı:
Tarih : 4 Aralık 2008 - Perşembe
Saat : 14:00 – 16:00
Yer : Akçalar Belediye Binası Toplantı Salonu Akçalar-Bursa

Toplantı Programı:
14:00 - 14:20 Açılış ve Tanıtım
14:20 - 14:50 Proje Tanıtımı
14:50 - 15:10 İklim Değişikliği, Karbon Ticareti ve Proje (GTE)
15:10 - 15:50 Forum (DSI – ETKB – ÇvOB – AKENERJİ – GTE)
15:50 - 16:00 Çevresel ve Sosyal Değerlendirme Listesi (GTE)

KONUYLA İLGİLİ BİLGİ ALMAK VE KATILIM İÇİN: shm@gte.uk.com ADRESİNE E-POSTA GÖNDEREBİLİR VEYA 0(232) 465 21 87 No'lu TELEFONU ARAYABİLİRSİNİZ.

Figure 7. Newspaper announcement dated 1st of December 2008 for first SC meeting of Uluabat HEPP

The meeting was held between 14:00 and 16:00 hours and some 60 minutes were dedicated to the presentation about the project, climate change and carbon markets.

Initial Stakeholder consultation meeting has been recorded to video and minutes have been noted. Comments have also been requested from government agencies and invitees by letters sent by mail.

Figure 8. Stakeholder Meeting / Uluabat HEPP

Mr. Kemal Ozarar from Akenerji made the presentations. Mr. Oguz Revanoglu, the project manager of Akenerji gave explanations about the project. Mr. Evren Kaleli from GTE gave explanations regarding the carbon emissions savings of the renewable energy projects and the carbon trade.

After the presentations and explanations, questions from the participants were answered by Mr. Oguz Revanoglu, the project manager of Akenerji.

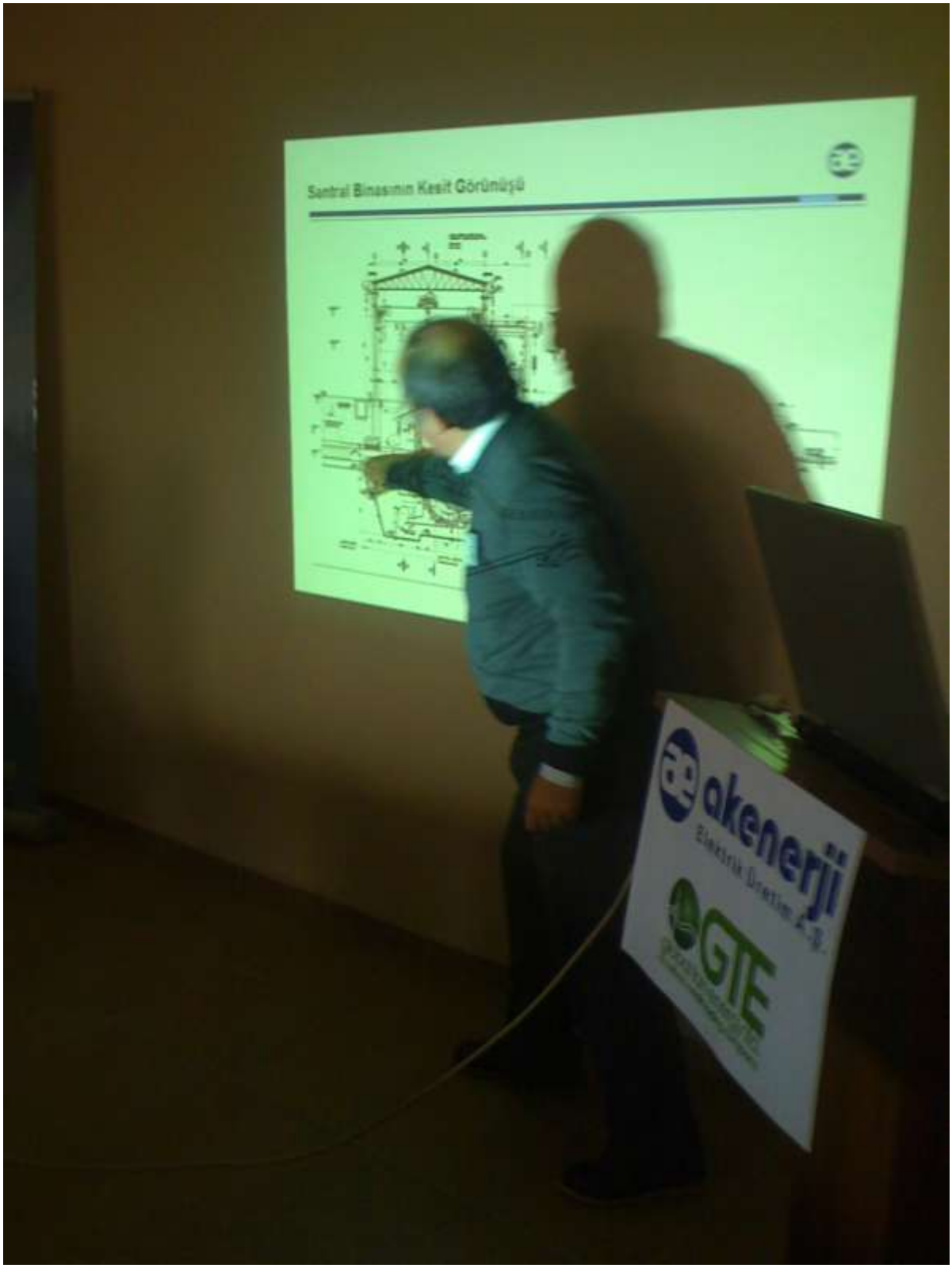


Figure 7. Stakeholder Meeting / Explanations by Oguz Revanoglu

Figure 9. Stakeholder Meeting / Questions from participants

E.2. Summary of the comments received:

The comments from stakeholder have been positive in general. The concerns raised by the participants were reduction of the oxygen content and the heating of the water outlet of the HEPP, the probable damage of the transmission tunnel to drinking water, closure of the water flowing in the riverbed, probable landslides filling the dam.

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

Akenerji has taken into account all comments and in general replied positively to the concerns and comments by the participants. The outlet water of the dam shall not be heated and the oxygen content shall not be reduced, shall be even above normal. Water shall be released to the riverbed. A special boring machine has been bought and boring shall be carried out without much damage on the surface. Landslides will be prevented from filling the dam by arranging rocks and concrete. .

SECTION F. Additional requirements by VCS

F.1. Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction (1.12):

The project activity involves construction of a large scale hydro electric Power Plant having installed capacity of 100 MW. Since the project activity involves electricity generation from renewable resources, it does not create any GHGs.

F.2. Demonstration that the project has not created another form of environmental credits(for example renewable energy certificates(1.13)):

Project owner confirms that the project activity does not create any other form of environmental credits.

F.3. Project rejected under other GHG programs(if applicable (1.14)):

Not Applicable. Project has not applied for any other GHG credit program.

F.4. Ownership- Proof of title (8.1)

The generation license issued by Energy Market Regulatory Authority (EMRA) of Turkey is the proof of the ownership for the plant. Also, the ERPA between project owner and the consultancy firm (GTE) is the proof for VER rights. Both documents will be submitted to DOE during validation.

F.5. Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable(8.2)):

Not applicable. Project does not participate in an emissions trading program.

F.6. Commercially Sensitive Information

PDD does not contain any commercially sensitive information.

Annex 1
CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	AKENERJI ELEKTRIK URETIM AS.
Street/P.O.Box:	Miralay Sefik
Building:	15
City:	Taksim
State/Region:	Istanbul
Postcode/ZIP:	
Country:	Turkey
Telephone:	(0090) 212 249 82 82
FAX:	(0090) 212 249 73 55
E-Mail:	info@akenerji.com.tr
URL:	http://www.akenerji.com.tr
Represented by:	
Title:	Project Coordinator
Salutation:	Ms.
Last name:	Palabıyık
Middle name	-
First name:	Özlem
Department:	Strategic Planning&Business Development
Personal e-mail:	opalabiyik@akenerji.com.tr

Organization:	Global Tan Energy Limited
Street/P.O.Box:	Ali Cetinkaya Bulvari Gundogdu Meydani
Building:	2/2
City:	Alsancak
State/Region:	Izmir
Country:	Turkey
Telephone:	(0090) 312 472 35 00
FAX:	(0090) 312 472 33 66
E-Mail:	email@gte.uk.com
URL:	www.gte.uk.com
Represented by:	
Title:	Director
Salutation:	Mr.
Last name:	Demirkol
Middle name:	Kemal
First name:	Mehmet
Department:	Management
Direct FAX:	(0090) 312 472 35 00
Direct tel:	(0090) 312 472 33 66
Personal e-mail:	kemal@gte.uk.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

NO PUBLIC FUNDING WAS USED FOR FINANCING THE PROJECT ACTIVITIES.

Annex 3
BASELINE INFORMATION

Data Used in calculation of OM for Turkish Electricity Grid

	NCV (Tj/kt) (1000m^3 for gas)	EF (tCO_2/Tj)	COEF(tCO2/kt)
Coal	21.83	89.5	1,954
Lignite	6.61	90.9	601
Fuel Oil	40.08	75.5	3,026
Diesel Oil	42.86	72.6	3,112
LPG	45.94	61.6	2,830
Naphtha	44.17	69.3	3,061
Natural Gas	36.88	54.3	2,003

Table 15. Values used in calculation of OM

	2005	2006	2007	Total Fuel Consumption 2005-2007	Total Emission 2005-2007
Hard Coal	5,259,058	5,617,863	6,029,143	16,906,064	34,915,268
Lignite	48,319,143	50,583,810	61,223,821	160,126,774	96,197,334
Fuel Oil	2,005,899	1,746,370	2,250,686	6,002,955	18,165,198
Diesel Oil	28,442	61,501	50,233	140,176	436,185
LPG	12,908	33	0	12,941	36,623
Naphtha	84,481	13,453	11,441	109,375	334,828
Natural Gas	15,756,764	17,034,548	20,457,793	53,249,105	106,643,758

Table 16. Amount of fuels used for electricity generation[55,56,]

Year	Gross Generation	Net Generation	Net/Gross	Gross.Gen. Thermal	Net.Gen Thermal	Import	Total
2005	161,956.2	155,469.1	0.960	122,242.3	117,345.9	636	117,982
2006	176,299.8	169,543.1	0.962	131,835.1	126,782.5	573	127,356
2007	191,558.1	183,339.7	0.957	155,195.2	147,274.7	864.3	148,139
Total Net Thermal Gen.					**392,665**	**2,073**	**393,476.5**

Table 17. Net Electricity supply to the grid by thermal plants and imports (GWh)[57]

55 http://www.teias.gov.tr/istatistik2005/46.xls

56 http://www.teias.gov.tr/ist2007/43.xls

Data Used in calculation of BM for Turkish Electricity Grid

	NCV	EF_{CO2}	Generation Efficiency	EF
	(Tj/kt or m^3 for gas)	(tCO_2/Tj)	%	(tCO_2/MWh)
Coal	21.83	89.5	39.0%	0.826
Lignite	6.61	90.9	39.0%	0.839
Fuel Oil	40.08	75.5	39.5%	0.688
Diesel	42.86	72.6	39.5%	0.662
LPG	45.94	61.6	39.5%	0.561
Naphtha	44.17	69.3	39.5%	0.632
Natural Gas	36.88	54.3	60.0%	0.326

Table 18. Net calorific values, generation efficiency and emission factor data used in calculations

Fuel Source	**Electricity Generated** (MWh)	**EF**	**Share in total generation**
Coal	1,463	0.826	3.6%
Lignite	11,482	0.839	28.0%
Fuel Oil	675	0.688	1.6%
Diesel oil	2	0.662	0.0%
LPG	50	0.561	0.1%
Naphtha	323	0.632	0.8%
Natural Gas	23,974	0.326	58.4%
Renewable and wastes	85	0.826	0.2%
Solid	5	0.839	0.0%
Total Renewable	2,999	0.688	7.3%
TURKEY'S TOTAL	41,056.3		100.0%

Table 19. Most recent capacity additions corresponding to 20%.[58,59,60,61]

[57] http://www.teias.gov.tr/ist2007/49.xls

[58] http://www.teias.gov.tr/istat2004/7.xls

[59] http://www.teias.gov.tr/istatistik2005/7.xls

[60] http://www.teias.gov.tr/ist2006/8.xls

[61] http://www.teias.gov.tr/ist2007/8.xls

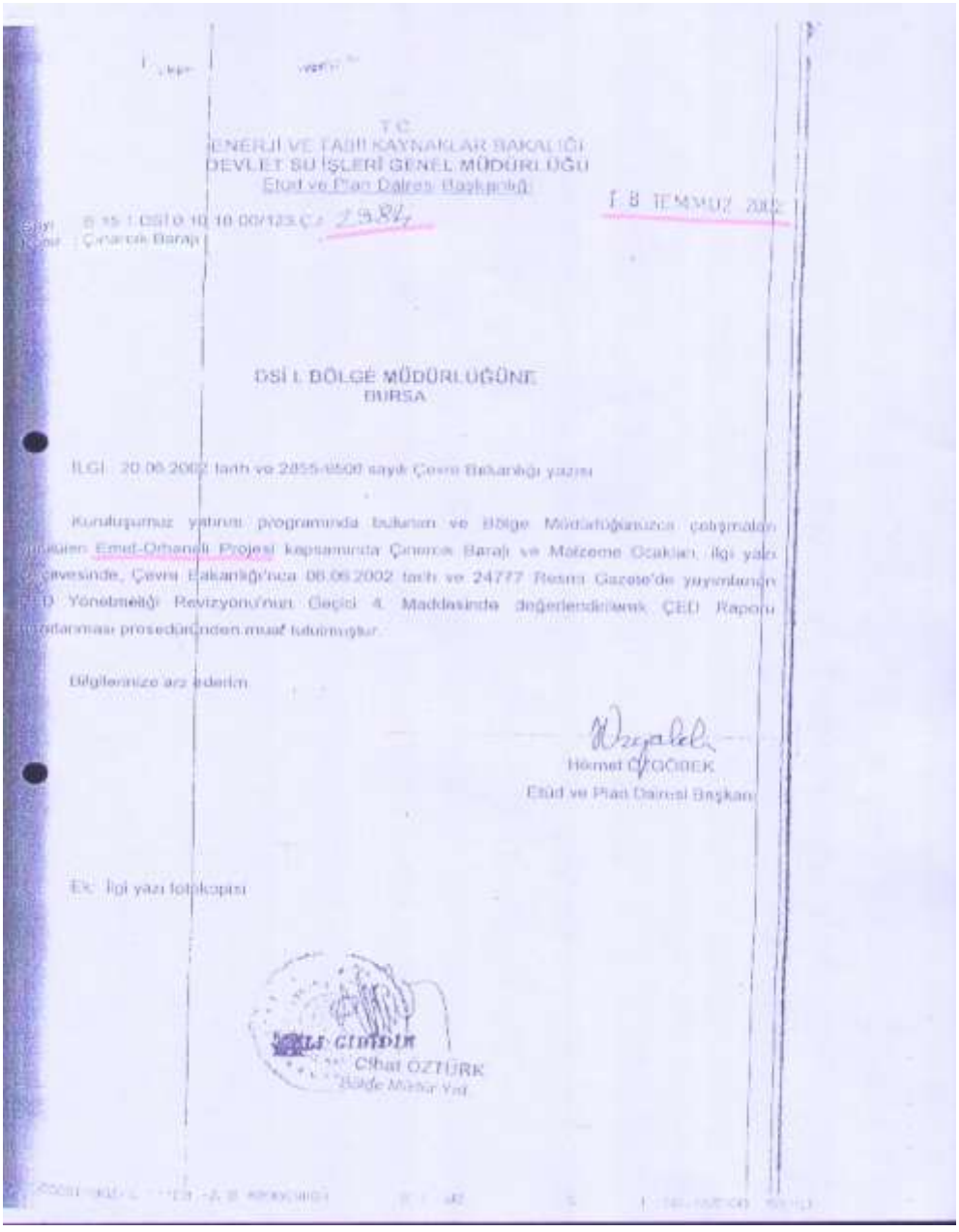
Annex 4

MONITORING INFORMATION

Information about monitoring plan is given in section B.7.2.

Annex 5

EIA EXEMPTION LETTER



T.C.
ENERJİ VE TABİİ KAYNAKLAR BAKANLIĞI
DEVLET SU İŞLERİ GENEL MÜDÜRLÜĞÜ
Etüd ve Plan Dairesi Başkanlığı

18 TEMMUZ 2002

Sayı : B.15.1.DSİ.0.10.10.00/123.Ç-2985
Konu : Çeltikçik Barajı

DSİ I. BÖLGE MÜDÜRLÜĞÜNE
BURSA

İLGİ : 20.06.2002 tarih ve 2855-6500 sayılı Çevre Bakanlığı yazısı

Kuruluşumuz yatırım programında bulunan ve Bölge Müdürlüğünüzce çalışmaları yürütülen Emet-Ohaneli Projesi kapsamında Çeltikçik Barajı ve Malzeme Ocakları, ilgi yazı cevabında, Çevre Bakanlığı'nca 08.06.2002 tarih ve 24777 Resmi Gazete'de yayımlanan ÇED Yönetmeliği Revizyonu'nun Geçici 4. Maddesinde değerlendirilerek ÇED Raporu hazırlanması prosedüründen muaf tutulmuştur.

Bilgilerinize arz ederim.

Hikmet ÇİÇEKDİK
Etüd ve Plan Dairesi Başkanı

Ek: İlgi yazı fotokopisi

UYGUNDUR
Cihat ÖZTÜRK
Bölge Müdür Yrd.

The Turkish Republic
Ministry of Energy and Natural Resources
Public Waterworks Administration
Study and Planning Office

Number: B 15 1 DSİ 0 10 16 00/123.Ç./ 2984 18 July 2002
Subject: Çınarcık Dam

For attention of First District Office of Public Waterworks Administration
Bursa

ATTACHMENT: The statement of the Ministry of Environment dated 20.06.2002 and numbered 2855-9506

Çınarcık Dam and Borrow Pit, as part of Emet-Orhaneli Project which is in our establishment's investment programme and is performed by your district Office, is exempted from the preparation of Environmental Impact Assessment Report after being evaluated in Provisional Article 4 of Environmental Impact Assessment Regulation Revision (published on the official gazette dated 06.06.2002 and numbered 24777) in accordance with the attached statement

I kindly submit for your information.

Hikmet ÖZGÖBEK
Head of Study and Planning Office

Enclosure: Photocopy of the statement

Annex 6

EIA EXEMPTION LETTER FOR THE TRANSMISSION LINE

T.C.
BURSA VALİLİĞİ
İl Çevre ve Orman Müdürlüğü

ÇED GEREKLİ DEĞİLDİR BELGESİ

TURKISH REPUBLIC GOVERNORSHIP OF BURSA
BURSA PROVINCE ENVIRONMENT AND FORESTRY

Date of adjudication: 15.08.2006
Number of adjudication: 344

EIA EXEMPTION LETTER

"Environmental Impact Assessment Exemption" decision has been decided for the operating project **" Installation of 34 units of pole which are approximately 10.972,10 m long with 2x1272 McM conductance in Akçalar-Görükle Brş.N-Uluabat hydroelectric power plant transmission line with 154 kV"** in accordance with Article 17 of Environmental Impact Assessment Regulation published on the official gazette dated 16 December 2003 and numbered 25318.

Owner of Operation: Directorate General of Turkish Electricity Administration
Place of Operation: Nilüfer district, Akçalar-Görükle

Ali Taşkın BALABAN
on behalf of the governor
Assistant Governor

Annex 7

GENERATION LICENSE

T.C.
ENERJİ PİYASASI DÜZENLEME
KURUMU

EPDK

ÜRETİM LİSANSI

Lisans No : EÜ/1237-1/879

Tarih : 27/06/2007

Bu Lisans, **Akenerji Elektrik Üretim Anonim Şirketi**'ne, Bursa İli, Mustafa Kemal Paşa İlçesi'nde kurulacak olan **Uluabat Kuvvet Tüneli ve Hidroelektrik Santralı** üretim tesisinde 27/06/2007 tarihinden itibaren 48 yıl 6 ay (kırksekiz yıl altı ay) süreyle, üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu, 5625 sayılı Kanun ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 27/06/2007 tarihli ve 1237-1 sayılı Kararı ile verilmiştir.

Yusuf GÜNAY
Başkan

Generation License Translation

REPUBLIC OF TURKEY
ENERGY MARKET REGULATORY AUTHORITY

A.	License Number	B.	:EU/1237-1/879
C.	Date	D.	:27/06/2007

GENERATION LICENSE

This license has been granted to Akenerji Elektrik Üretim Anonim Şirketi in order to be engaged in Uluabat Power Tunnel and Hydroelectric Power Plant to be implemented in Mustafa Kemal Paşa District of Bursa Province for 48 years and 6 months starting from 27/06/2007 , by decision of Energy Market REgulatory Authority dated 27/06/2007 and numbered as 1237-1 in accordance with the electricity market law numbered 4628, law numbered 5625 and relevant regulation.

(Signed and Selaed)

Annex 8

Project Timeline

Activity	Date
EM equipment purchase agreement	07/04/2006
Start of Energy Transmission Line Construction	01/07/2006
Start of Penstock Construction	01/05/2006
Start of Tunnel Construction	01/06/2006
Construction Agreement	12/10/2006
Start of Powerhouse Construction	01/08/2007
Start of Switchgear Area Construction	01/11/2007
Start of Tailwater channel Construction	01/11/2007
Start of EM Installation	01/11/2008
Approval and Commissioning	01/10/2010

Table 20. Main project activities