CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Title: CATALOLUK HEPP
Version: 01
Date: 11/06/2010

A.2. Description of the small-scale project activity:

The Cataloluk Regulator and Hydroelectric Power Plant is a run-off-river type project located on Tekir Creek at about 55 km north of Kahramanmaras Province and 40 km south of Göksun District. Proposed project consists of a hard-fill weir located at 823.5m altitude and 17m height from the thalweg level whereas the powerhouse will be located at about 724.5 m altitude.

Other Project elements include conveying channel (1447.6m) and tunnel (1252.4 m), forebay and penstock, which provide a gross elevation difference of about 114.5m, powerhouse and two horizontal francis type turbines. The energy generated at Cataloluk HEPP will be transmitted to the Caglayan 31.5/154kV switchyard station

The installed capacity of the plant is designed as 9.54MW which will generate a total of annual output of 31.99 GWh. As a result of the project optimization, the maximum amount of 10 m^3/s water usage in the turbines is thought to be economical. In return for annual energy generation, an annual carbon reduction of 17,499 tCO2 is expected according to the 2006-2008 Turkish Statistics of Electricity.

Proposed project has been initially implemented by Guvenen AŞ with an estimated cost of 11M USD in feasibility report. However, due to unexpected costs of construction, the investment amount has increased more than two folds and as a result the project has stopped due to financial difficulties. Alter, project has been purchased by Beytek Elektrik Üretim AŞ in 10/07/2009 and completed by Beytek on 01/04/2010

Main goals of the Cataloluk HEPP Project include;

- Utilization of the hydroelectric potential of Turkey in order to meet booming electricity demand and guarantee the energy security.
- Preventing flooding risk in the region which has caused significant destruction in the region in recent years
- Increase share of HEPPs in electricity generation mix of Turkey and reduction of GHG emissions.
- Contribute to the national economic development by creating direct and indirect job opportunities during construction and operation phases.
- Reduce import dependency of fossil fuel dominated electricity sector and diversify generation mix through use of local resources.
- Contribution to sustainable development through supporting local community and local economy.

In terms of sustainable development project not only contributes to emission reduction through use of renewable resources and creating job opportunities, it also contributes to local development by supporting educational and social events in the region. In terms of environmental impact, project is considered to have positive impact on air quality due to avoided NOx, PM and SOx emissions whereas no negative impact on water quality other pollutants and biodiversity has been identified. In order to avoid impact on aquatic life in the river bed, minimum 10% of average flow of last ten years will be continuously released from the weir as required by the State Hydraulic Works Authority(DSI).

According to the research conducted by State Planning Organization(SPO) on socio-economic level of Districts in Turkey, Göksun District is ranked as 572nd among 872 Districts in Turkey in terms of development level and classified in fourth(out of six) group. About 78.8% of the population works on agriculture and 19.1 % works on service sector whereas only 2.1% works on industry. The Göksun District is having is ranked as 160th in terms of unemployment and 678th in terms of per capita income. In that respect, direct and indirect contribution of project activities to local economy through employment and supply of needs from the region will have a significant effect on local economy.

In addition to contribution to local economy, project will also contribute use of local and renewable resources to meet the increasing energy demand of Turkey and reduce dependency on fossil fuels. According to Turkish Electricity Transmission Company (TEIAS) statistic, in 2007 about 50% of the electricity has been generated by natural gas (NG) power plants which is fully imported and 20bn m^3 NG has been consumed. In terms of fuel dependency, Cataloluk HEPP is expected to replace about 7.1 million m^3 NG and contribute to balance of payments which will, in addition, increase air quality and access to affordable energy services in national level[1].

Milestone	**Date**
EIA Exemption Letter	30/12/2009
License Issuance	25/05/2005
Start of Construction	09/03/2006
EM Equipment Purchase Contract	09/08/2007
Transfer of Project Shares to Beytek	10/07/2009
Subcontractor agreement (Transmission Line)	02/10/2009
Water Right Utilization Agreement	18/12/2009
Revised Feasibility Report	01/08/2008
System Connection Approval	15/02/2010
Expected Commissioning Date	01/05/2010

*Date of investment decision

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

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)	•BEYTEK Elektrik Üretim AŞ •Global Tan Energy Ltd.	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

Project is located within the boundaries of Kahramanmaraş Province of Turkey. Project site located between 37°48'' - 37°50'' North latitudes and 36°38'' - 36°40'' East longtitudes.

A.4.1.1. Host Party(ies):

Although Turkey, the Host Country, passed legislation in Parliament on 05/02/2009 to ratify the Kyoto Protocol - Turkey does not have a quantitative emission reduction limit yet and it is likely that it will not have a quantitative emission reduction limit until post 2012. As such, Turkey will in the interim period continues to be eligible for voluntary emission reduction projects.

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

Mediterranean Region/KahramanMaras Province

A.4.1.3. City/Town/Community etc:

Göksun District of Kahramanmaras Province

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

	Longtitude	Latitude
Weir	E 36°38'29.04	N 37°50'42.95
Powerhouse	E 36°39'37.48	N 37°49'19.35"

Figure 1. Cataloluk Hepp Location

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

Type I: Renewable Energy Projects
Category I D: Grid connected renewable electricity generation
Sectoral scope 1: Energy Industry – Renewable Sources

Project activity involves establishing a run-off-river type HEPP to utilize the running water of Tekir Creek. The project consists of two turbines and generators which are used to transform the potential energy of water to mechanical energy at a first stage and later into electrical energy.
Technical characteristics of Cataloluk HEPP have been summarized in table below.

LOCATION:	Tekir Creek, Goksun District
DESIGN DISCHARGE:	10 M^3/SEC
LENGTH OF CONVEYANCE CHANNEL:	1.45 KM
LENGTH OF CONVEYANCE TUNNEL:	1.25 KM
GROSS HEAD:	114.5 M
TOTAL INSTALLED CAPACITY:	9.54 MWe
NUMBER OF UNITS:	2 EACH
TURBINE TYPE:	FRANCIS TYPE – HORIZONTAL AXIS
TURBINE MANUFACTURER:	WKV
NUMBER OF PENSTOCKS:	1
LENGTH OF PENSTOCKS:	193 M
AVERAGE ANNUAL POWER GENERATION:	31.99 GWH
GRID CONNECTION	THE GRID CONNECTION WILL BE PROVIDED BY MEANS OF ENERGY TRANSMISSION LINE TO THE YUKARI CAGLAYAN STATION

(154/34.5 KV) WHICH IS OWNED BY TEIAŞ.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tons of CO_2 e
2010(01/05/2010)	11,166
2011	17,499
2012	17,499
2013	17,499
2014	17,499
2015	17,499
2016	17,499
2017 (01/01/2017-30/04/2017)	5,833
Total emission reductions (Tons of CO_2 e)	**122,493**
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tons of CO_2e)	17,499

A.4.4. Public funding of the small-scale project activity:

No public funding or ODA is used for the Cataloluk HEPP project

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

Project is not a part of debundled project activity. There is no registered small-scale VER activity or an application to register another small-scale VER project activity[2]:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed project

[2] http://cdm.unfccc.int/methodologies/DB/UX8NR66U85988BFYZJ70BIIZNUHC9H/view.html

SECTION B. Application of a baseline and monitoring methodology

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

The UNFCCC approved simplified baseline and monitoring methodology AMS I.D., version 15[3] released on 30/10/2009 was applied for the project activity.

B.2 Justification of the choice of the project category:

The choice of methodology AMS I.D, is justified as the project activity meets its applicability criteria:

- The Cataloluk HEPP is a grid connected renewable electricity generation project,
- The project does not involve combined heat and power generation activity
- Installed power capacity of the project is below 15 MW
- 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 is a run-off-river type HEPP and does not have storage capacity and power density is greater 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.
- The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

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

[3] http://cdm.unfccc.int/UserManagement/FileStorage/7QXAZ5036WN8BEYKUDFRPJGL21V4I9

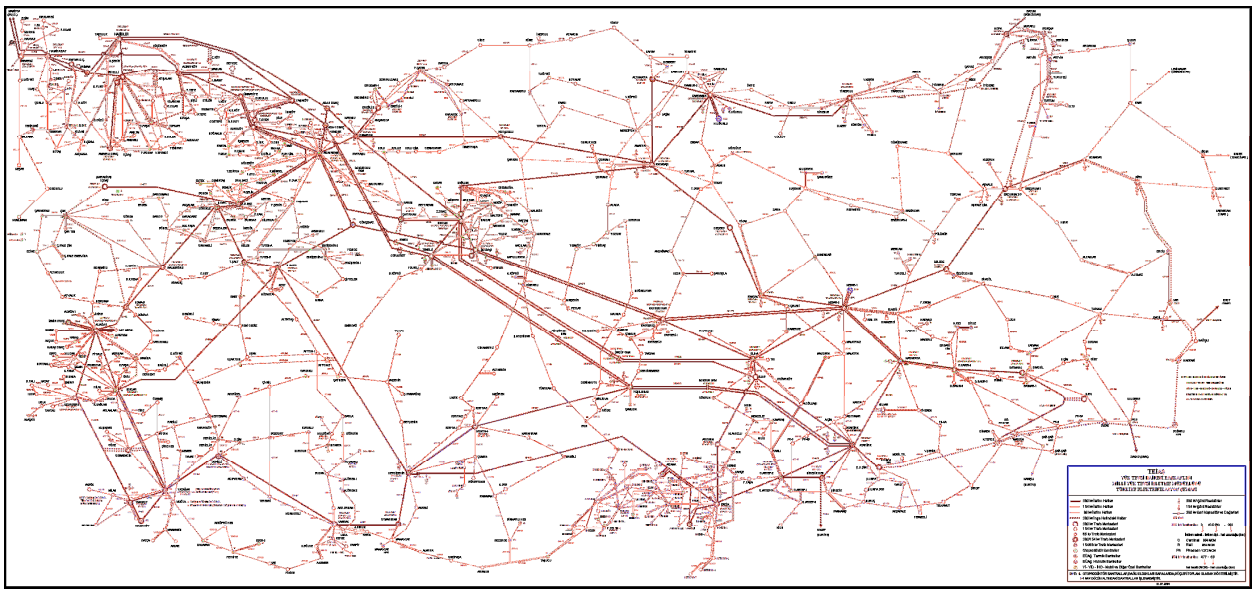

Figure 2. Turkish Electricity Grid

B.3. Description of the project boundary:

Project boundary is defined as limited to the project activity site according to the applied methodology. For the proposed project activities, project boundary involves, Cataloluk Weir, Penstock, Conveyance line and Powerhouse as defined in section A.2 and A.4.1.4 in detail.

B.4. Description of baseline and its development:

According to the methodology baseline scenario has been identified as "The kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/kWh) calculated in a transparent and conservative manner as:

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

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

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

by the large natural resource availability in Turkey, especially the abundance of economically accessible lignite.

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

According to the TEIAS statistics[4], share of HEPPs in total installed capacity of Turkey is about 33.1% whereas share of HEPPs in total generation is only 16.8%[5]. However, when the historical data is examined, 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 current levels as shown in the figure below [6,7].

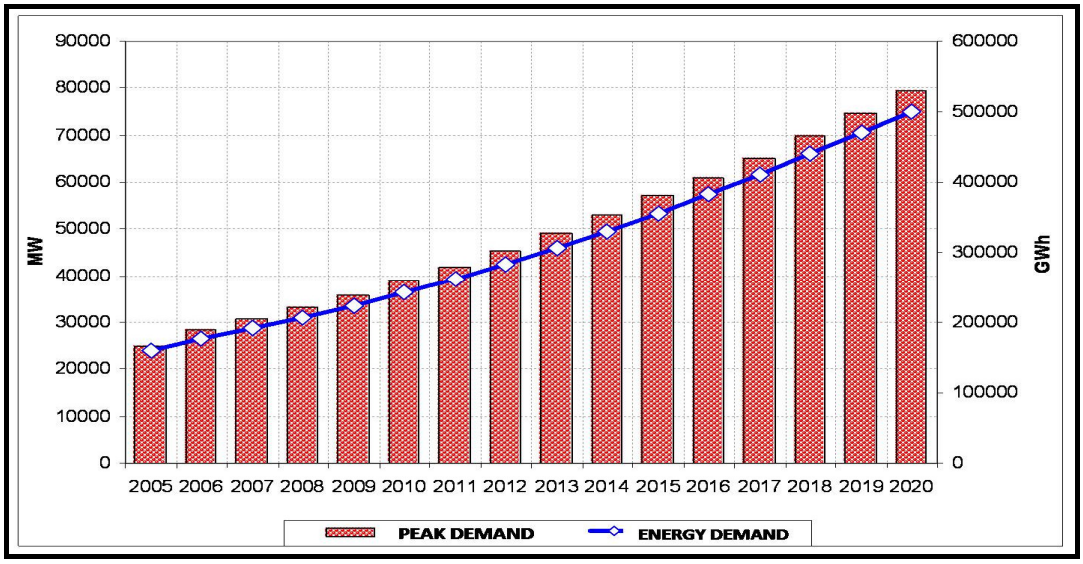

Figure 3. Peak Load and consumption projection for Turkish electricity system between 2005-2020[8]

4 http://www.teias.gov.tr/istatistik2008/1.xls

5 http://www.teias.gov.tr/istatistik2008/13.xls

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

7 IEA Turkey Country Report, 2005

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

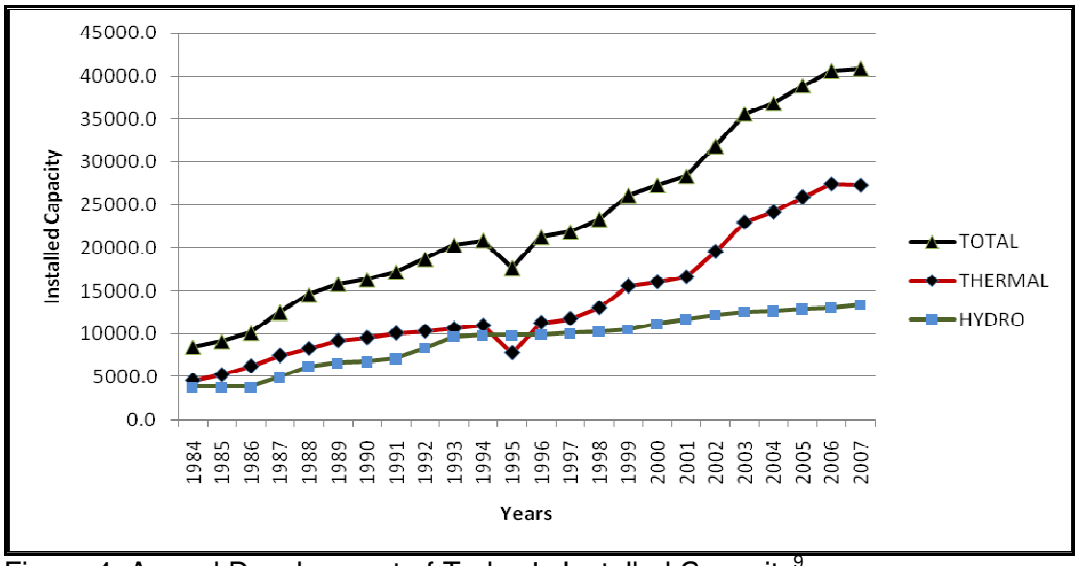

Figure 4. Annual Development of Turkey's Installed Capacity[9]

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 small-scale CDM project activity:

According to the applied methodology the baseline scenario for the project has been defined as "generation of equal amount of electricity by the power plants connected to the grid". Emission factor for the baseline scenario has been calculated according to the combined margin approach as defined by the selected methodology. Within this framework, the project is expected to generate about 38.99 GWh electricity and reduce about 17,499 tCO_2 emissions annually through replacing the electricity that would need to be supplied via the National grid in the absence of the project activity.

Additionality

Additionality of the proposed project has been assessed according to the Appendix B of the applied methodology. Main barriers identified are financial barriers which are given in detail below. Also, common practice analysis has been performed for the hydroelectric power plants in Turkey.

Financial Barriers

Revised feasibility study which forms the basis for investment decision has been published on August 2008 and the investment cost has been estimated as 12,798,156 USD at that time. However, due to significant cost increase of construction expenses, the investment cost has increased more than one fold and the investment has been stopped by the owners due to financial difficulties with loan providers. Proposed project has later been purchased by Beytek Elektrik Üretim AŞ by 10/07/2009 and commissioned by 01/05/2010 through additional funds

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

provided. Date of purchase agreement between Güvenen AS to Beytek AS has been identified as the date of investment decision and the analysis has been based on data available on this date.

Investment analysis for Cataloluk HEPP has been conducted considering the methodology applied and using parameters given below. The investment cost figures have been adopted from purchase agreement and converted to € currency using average currency rates at time of contract date which is 10/07/2009, date of revised feasibility report. The investment 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. Electricity tariff has been used as 5.5€ Cent/kWh which is the maximum guaranteed price as stated in renewable energy law (whereas the average market price between July 2008 and July 2009 has fluctuated between 4.41€c(October 2008) and 8.79€c(April 2009) per kWh.

Parameters	Unit	Data Value
Installed Capacity	MW	9.54[10]
Grid Connected output	GWh	38.99[10]
Capital Investment	Million €	17.871[11]
Corporate tax rate	%	20
Loan	Million €	12.600
Expected Tariff	€ Cents/kWh	5.5[11]
Expected VERs price	€/ tCO_2e	9

Table 1. Main financial parameters used for investment analysis

According to the investment analysis made for Cataloluk HEPP, Equity IRR for the project has been calculated as 7.14% in the absence of carbon revenue. When carbon revenue is included to the project income, project IRR increases to 8.45% and the project becomes more viable. This IRR value represents the most optimistic scenario in terms of capital investment and electricity generation whereas electricity tariff is expected to increase due to increasing electricity demand so that the investment becomes attractive.

For benchmark analysis of the project, Government bond rates from web page of a Government Bank have been used as given in table below which has an average og 6.73% for bonds selected considering analysis period. Benchmark for equity IRR has been derived from government bond rates increased by a suitable risk premium to reflect private investment and/or project type. Considering the Government bond rates and estimated country risk premiums which are around 9.41% for Turkey[12], it can be concluded that expected return on investment for these types of projects should be above 16.14% for reasonable investors. For Cataloluk HEPP, in order to reach this IRR values, average electricity tariff must be around 9€c/kWh in the absence of carbon revenue so that the investment will become reasonable. Considering that control of run-off-river hydroelectric power plants on generation period is

[10] Cataloluk HEPP Feasibility Report

[11] Cataloluk HEPP Share Transfer Agreement

[12] http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem06.xls

limited and that Cataloluk HEPP has no storage capacity, 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.

However, due to the uncertainty in economical environment, demand for electricity has decreased significantly in recent years which have frustrated the investors expecting higher electricity prices. Under this circumstances most reliable scenario for financiers and investors is the renewable law which guarantees 5.0€ to 5.5€ cents per kWh. Recent trends in global economy have shown that the consideration of guaranteed price is a realistic and reliable scenario that should be considered in investment analysis for similar projects.

Following figure is given in order to reflect the actual electricity prices realized obtained from monthly reports of Market Settling and Balancing Center[13] between 01/01/2009-31/01/2010. It should be considered that these prices are highest prices obtained and power plants which sell electricity through bilateral agreements have lower income. Figure shows that the actual prices have even been lower than guaranteed price in some cases therefore assumption of 5.5€cents per kWh (or 55€ /MWh) is a realistic scenario as demonstrated below.

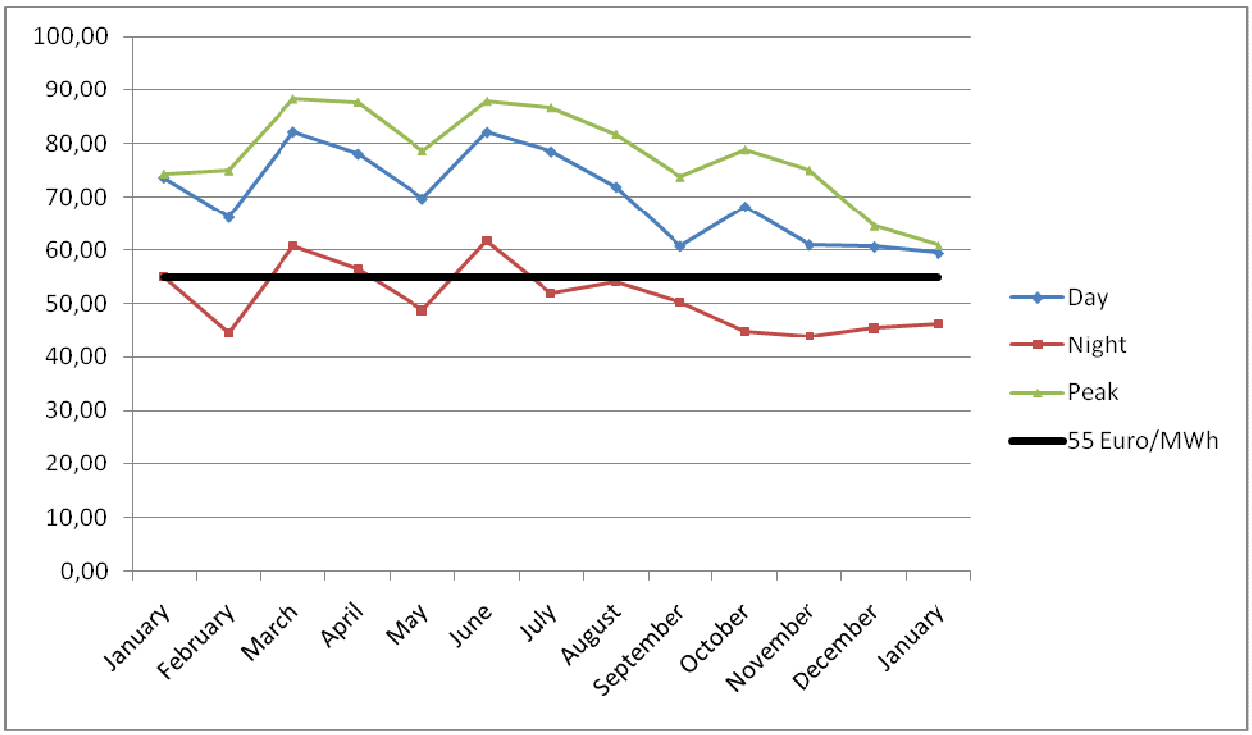

Figure 5. Highest tariffs observed between January 2009-January 2010 (€/MWh)

This IRR value represents the most optimistic scenario in terms of capital investment, electricity tariff and generation. This figure, when compared with Turkish bond yields in the market, it is

[13] http://pmum.teias.gov.tr/UzlasmaWeb/ (Accessed on 01/04/2010)

seen that the project is not financially attractive for investors as bond rates guarantee the same income without any investment risk.

Government Bond	Auction Date	Rate	Currency
US900123BA75	03/04/2018	6.52	USD
US900123BD15	11/03/2019	6.71	USD
US900123BF62	07/11/2019	6.82	USD
US900123AX87	05/06/2020	6.77	USD
US900123AW05	05/02/2025	7.05	USD
US900123BA75	03/04/2018	6.52	USD
Average:		**6.73**	

Table 2. Bond rates available at time of investment decision used for the benchmark analysis[14]

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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

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

For calculation of the emission factor of Turkish Grid, “Tool to Calculate the Emission Factor for an Electricity System”, ver. 2 has been used.

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

		2008	2007	2006	2005	2004	Average
Total Generation	**[GWh]**	198,418	191,558	176,300	161,956	150,698	175,786
Low-cost/must run	**[GWh]**	34,279	36,362	44,465	39,714	46,235	40,210,8

[14] http://www.ziraat.com.tr/tr/bankamiz/faiz-ve-ucretler/aspx/eurobond.aspx

Low-cost/must run	**[%]**	17	19	25	25	31	23

Table 3. Breakdown by source of the electricity generation for the five most recent years[15]

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

Data / Parameter:	**EG_y**
Data unit:	GWh
Description:	Net Electricity delivered to the grid by Cataloluk HEPP in year y
Source of data used:	Feasibility Report for Cataloluk HEPP
Value applied:	31.99 GWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used for emission reduction estimation.
Any comment:	

Data / Parameter:	**$EG_{y, Total}$**
Data unit:	GWh
Description:	Net Electricity delivered to the grid by power plants in Turkey in year 2008
Source of data used:	TEIAS web page - http://www.teias.gov.tr/istatistik2008/30(84-08).xls
Value applied:	189,761.9 GWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used for emission reduction calculation (for calculation of OM, Net-to-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"

[15] http://www.teias.gov.tr/istatistik2008/13.xls

Source of data used:	-For EF of fossil fuels, IPCC values at the lower limit have been used.
Value applied:	**Fuel Source** / **EF(tCO2/Tj)** Coal 89.5 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/istatistik2008/43.xls)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used for OM calculation

Data / Parameter:	**GE**
Data unit:	%
Description:	Generation efficiency of thermal power plants
Source of data used:	Annex I of the Tool used.
Value applied:	See Annex 3
Justification of the choice of data or description of measurement	Data used for BM calculation

methods and procedures actually applied :	
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/istatistik2008/46.xls)
Value applied:	See 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:	

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’’, Version 02, 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 41,817.2 MW and gross generation about 198,418.0 by 2008[16,17].

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

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional)
Option I has been chosen by the project developer hence only grid power plants are included in calculations.

[16] http://www.teias.gov.tr/istatistik2008/6.xls

[17] http://www.teias.gov.tr/istatistik2008/20(2006-2008).xls

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

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

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

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

For this project the ex-ante approach is selected. Data for calculating the three year average is obtained from the period 2006 – 2008, the most recent data available at the time of PDD submission to the DOE.

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

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

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

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

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,y} * NCV_{i,y} * EF_{CO_2,i.y}}{EG_y} \quad \textbf{(1)}$$

where:

$EF_{grid,\ OM,\ y}$ Simple operating margin CO_2 emission factor in year "y" (tCO_2/GWh)

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

For the calculation of the Simple OM, the amount of fuel consumption ($FC_{i, y}$) and heating values of fuels are taken from website of TEIAS[18,19], the official source of related data. Fuel consumption values for the relevant years are given in table below:

	$FC_{i,y}$ unit [Ton, except for Natural Gas (NG) (1000 m^3)]			
Fuel Type	**2008**	**2007**	**2006**	**Total**
Hard Coal	6,270,008	6,029,143	5,617,863	17,917,014
Lignite	66,374,20	61,223,821	50,583,810	178,181,751
Fuel Oil	2,173,371	2,250,686	1,746,370	6,170,427
Diesel Oil	131,206	50,233	61,501	242,940
LPG	0	0	33	33
Naphtha	10,606	11,441	13,453	35,500
Natural Gas	21,607,635	20,457,793	17,034,548	59,099,976

Table 9. Fuel Consumption in thermal power plants

The NCV of the fuels consumed have been calculated using data from the TEIAS web page. The emission 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 (2006 - 2008)** (tons or $1000m^3$)	**Total Emission (2006 - 2008) (tCO_2)**
Coal	1,985	17,917,014	35,571,662
Lignite	625	178,181,751	111,311,693
Fuel Oil	3,013	6,170,427	18,590,041
Diesel Oil	3,093	242,940	751,393

[18] http://www.teias.gov.tr/istatistik2008/44.xls

[19] http://www.teias.gov.tr/istatistik2008/46.xls

LPG	-	33	0
Naphtha	3,040	35,500	107,934
Natural Gas	1,992	59,099,976	117,716,966
Total Emissions			**284,049,689**

Table 10. Calculation of emission factors for fuels

Net electricity generated and supplied to the Grid by thermal plants has been calculated using data obtained from the TEIAS web page[20]. The ratio between gross and net generation has been calculated first, and assuming that the same ratio is valid for thermal plants; gross generation by thermal power plants has been multiplied by this ratio in order to find net generation by thermal plants. The calculation of $EF_{grid,OM,\ y}$ requires the inclusion of electricity imports with an emission factor of 0 tCO_2/GWh. By including the imports in the electricity production this requirement is fulfilled. Summing up this with the imported electricity, total supply excluding low cost / must run sources are determined as given in table below.

Year	Gross Generation	Net Generation	Net/Gross	Gross Gen. Thermal[21]	Net Gen. Thermal	Import	Total Supply to the Grid
2006	176,299	169,543	0.962	131,835	126,783	573	127,356
2007	191,558	183,340	0.957	155,196	148,537	864	149,401
2008	198,418	189,762	0.956	164,139	156979	789	157.768
			Total Net Thermal Gen.		**432,298**	**2,227**	**434,525**

Table 41. 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;

$\mathbf{EF}_{grid,\ OM,\ y}$ = 284,049,689 tCO_2 / 434,524,925 MWh

= 0.654 tCO_2/MWh.

Step 5. 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[22].

[20] http://www.teias.gov.tr/istatistik2008/30(84-08).xls

[21] http://www.teias.gov.tr/istatistik2008/13.xls

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

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 TEİAŞ web page [23,24,25,26,27]. For determination of plants that comprise 20% of the system's generation, gross generation in year 2008 which is 198,418 GWh has been taken as reference and its 20% has been determined as about 39,684 GWh. Since 20% of the most recent year's generation falls partly on capacity of a 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 45,776 GWh which reduces again to 44,237.3 GWh after excluding plants benefitting from VER revenue.

Step 6. 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:

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

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[28,29] and corresponding

23 http://www.teias.gov.tr/istat2004/7.xls
24 http://www.teias.gov.tr/istatistik2005/7.xls
25 http://www.teias.gov.tr/ist2006/8.xls
26 http://www.teias.gov.tr/ist2007/8.xls

41 http://www.teias.gov.tr/istatistik2008/8.xls

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

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

electricity generation[30, 31] which shows that values used are very conservative compared to actual situation.

	EF CO_2 (tCO2/Tj)	Generation Efficiency	EF (tCO_2/MWh)
Coal	89.50	39.0%	0.826
Lignite	90.90	39.0%	0.839
Fuel Oil	75.50	39.5%	0.688
Diesel	72.60	39.5%	0.662
LPG	63.07	39.5%	0.561
Naphtha	73.33	39.5%	0.632
Natural Gas	56.10	60.0%	0.326

Table 52. 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	Emission by Source
Coal	1,125	2.5%	0.826	929
Lignite	11,482	25.1%	0.839	9.634
Fuel Oil	208	0.5%	0.688	143
Diesel oil	2	0.0%	0.662	1
LPG	50	0.1%	0.561	28
Naphtha	0	0.0%	0.632	-
Natural Gas	26,907	58.8%	0.326	8.766
Renewable and wastes	85	0.2%	0.000	0.00
Solid	5	0.0%	0.000	0.00
Total Renewable	5,912	12.9%	0.000	0.00
TOTAL	**45,776**	**100.0%**		**19,503**
Capacity Built by VER Revenue	1,539			
Net Capacity Addition	44,237.3			

Table 63. Most recent capacity additions corresponding to 20% by fuel source

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

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

PROJECT	TYPE	INSTALLED CAPACITY (MW)	GENERATION CAPACITY (GWh)	STANDARD
ANEMON	WPP	30,4	92	GS
BARES	WPP	30	105	VER+
DOGAL ENERJI(BURGAZ)	WPP	14,9	48	GS
KARAKURT	WPP	10,8	28	GS
MARE MANASTIR	WPP	39,2	129	GS
ŞAMLI	WPP	21	104	GS
DATCA	WPP	8,1	24	GS
CATALCA	WPP	60	210	GS
YUNTDAG	WPP	42,5	161	GS
LODOS	WPP	24	85	GS
SAYALAR	WPP	30,6	97	GS
SEBENOBA	WPP	21,2	100	GS
DEGIRMENUSTU*	HEPP	25,7	69	VCS
HAMZALI	HEPP	16,7	117	GS
CALDERE	HEPP	8,7	35	VCS
KARGILIK	HEPP	23,9	83	VCS
KALEALTI	HEPP	15	52	VCS
Total		**422,7**	**1.539**	

Table 7. List of plants identified as VER projects

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

$$EF_{grid,\,BM,\,y} = 19{,}503\ tCO_2 / (45{,}776.3\text{-}1{,}539)\ GWh$$
$$= \mathbf{0.441\ tCO_2/GWh}$$

STEP 7 - Calculate the combined margin(CM) emission factor

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

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

Where:

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

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

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

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

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

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

$$\mathbf{EF}_{grid,\,CM,\,y} = 0.5 * 0.654 + 0.5 * 0.441 = \mathbf{0.547}$$

The combined margin emission factor is therefore **0.547 tCO_2/MWh.** Emission factor will remain same during the first crediting period as recommended by the methodology ACM0002, version 10.

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

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

Where:

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

Baseline emissions

Baseline emission is calculated according to the formula

$$BE_y = EG_y \times EF_y$$

Where:

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

EFy = Emission factor calculated according to selected methodology

Baseline emissions

Baseline emission is calculated according to the formula

$$BE_y = EG_y \times EF_y$$

Where:

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

EFy = Emission factor calculated according to selected methodology

Project emissions

The proposed project activity involves the generation of electricity by a hydroelectric power plant which has power density higher than $10W/m^2$ therefore emissions from reservoir is ignored 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 proposed project HEPP,

Cap_{PJ}	=	9.540 000 W
Cap_{BL}	=	0.0 W
A_{PJ}	=	140,000 (m^2)[32]
A_{BL}	=	0.0 (m^2)

Therefore PD is calculated as ;

$$PD = \frac{9540000 - 0}{140000 - 0}$$

$$PD = 68.1\ W/m^2$$

Leakage

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

$$LE_y = 0$$

As a result: Total Emission Reduction is;

[32] Cataloluk HEPP pre-EIA study, page 6

$$ERy = BE\ y$$

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

Years	Estimation of Project Activity Emissions* (*Tonnes of CO_{2e}*)	Estimation of Baseline Emissions (*Tonnes of CO_{2e}*)	Estimation of Leakage (*Tonnes of CO_{2e}*)	Annual estimation of emission reductions (Tonnes of CO_{2e})
2010(01/05/2010)	0	11,666	0	11,666
2011	0	17,499	0	17,499
2012	0	17,499	0	17,499
2013	0	17,499	0	17,499
2014	0	17,499	0	17,499
2015	0	17,499	0	17,499
2016	0	5,833	0	5,833
2017 (01/01/2017-30/04/2017)				
Total (Tonnes of CO_{2e})	**0**	**122,493**	**0**	**122,493**

Table 8. Estimated emission reduction by the proposed project

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG_{facility, y}$**
Data unit:	GWh
Description:	Net Electricity generated and delivered to the grid by Cataloluk power plant 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 calculating expected emission reductions in section B.5	Estimated annual generation forming the basis for emission reduction calculation is 31.99 GWh
Description of	Generation data will be recorded by two metering devices continuously. These

measurement methods and procedures to be applied:	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:	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	N/A
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 or maps
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 are 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.

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 for 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
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 and monitoring methodology and the name of the responsible person(s)/entity(ies)

Baseline Study and monitoring methodology completed in 15/06/2009
Baseline Calculated By:
Mehmet Kemal Demirkol -
Global Tan Energy Limited (GTE- http://www.gte.uk.com)
Telephone: +90 312 472 35 00
Fax: +90 312 472 33 66
E-mail: kemal@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:

Starting date of the project activity has been identified as 10/07/2009, date of share transfer of the project.

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

The expected operational lifetime of the project is about 46 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:

C.2.1. Renewable crediting period

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

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

The first crediting period will start in 01/05/2010.

C.2.2.2. Length:

First crediting period will be valid for seven years.

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

A Project Identification File has been prepared for Cataloluk HEPP project by Tekstila Ltd. Şti. in December 2009 considering final project design, in order to assess the Environmental Impacts of the project, including its location, its characteristics, capacity, interaction with other plants in the vicinity, utilization of natural resources, waste management, social and economical impacts, any natural and historical protected areas within the project boundaries, assessment of geological and seismic aspects of the project site.

This Report has been evaluated by the relevant local government agencies and by the Ministry of Environment and Forestry and the Environmental Effects Evaluation and Planning General Management. After evaluation of the project and comments of the local agencies, the Ministry of Environment and Forestry has concluded that project does not have any significant environmental effect and gave a decision on 30.12.2009 that no EIA is required for the project activities. The EIA not required certificate is given in Annex 5

Also, since the project is a run-off-river type hydro electric power generation activity, effects of project on environment has been assessed according to the table C.2 of special guidance of Gold Standard Toolkit. Assessment has shown that project activity complies with GS guidance for run off river type HEPPs.

In addition to all existing local regulations, project owner has issued all additional pre-cautions to minimize any adverse environmental impacts that may be caused by project activity as a company policy

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:

No significant negative permanent affect of the project has been identified during evaluation of related authorities and stakeholder meeting. The feasibility report covers some aspects of EIA in including social impacts, technology and materials used current land use in the region, waste deposition, dust and noise control geological assessment of the project site and any communities affected by the project.

SECTION E. Stakeholders' comments

Stakeholder consultation meeting is planned to be organized by July 2010 according to GS reules. Results will be included here.

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

>>

E.2. Summary of the comments received:

>>

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

>>

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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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	22.18	94.6	1.985
Lignite	6.87	90.9	625
Fuel Oil	39.90	75.5	3.013
Diesel Oil	42.60	72.6	3.093
LPG	0.00	61.6	-
Naphtha	43.87	69.3	3.040
Natural Gas	36.68	54.3	1.992

Table 15. Values used in calculation of OM [33]

	2006	2007	2008	Total Fuel Consumption 2006-2008	Total Emission 2006-2008
Hard Coal	5,617,863	6,029,143	6,270,008	17,917,014	35.571.662
Lignite	50,583,810	61,223,821	66,374,120	178,181,751	111.311.693
Fuel Oil	1,746,370	2,250,686	2,173,371	6,170,427	18.590.041
Diesel Oil	61,501	50,233	131,206	242,940	751.393
LPG	33	0	0	33	0
Naphtha	13,453	11,441	10,606	35,500	107.934
Natural Gas	17,034,548	20,457,793	21,607,635	59,099,976	117.716.966

Table 16. Amount of fuels used for electricity generation[34]

Data Used in calculation of BM for Turkish Electricity Grid

	A NCV	B EF $_{CO2}$	D	E (=3.6/D/1000*B)
	(Tj/kt or m^3 for gas)	(tCO_2/Tj)	Generation Efficiency	EF [35] tCO_2/MWh

[33] 2006 IPCC Guidelines for National Greenhouse Inventories

[34] http://www.teias.gov.tr/istatistik2008/44.xls

35 IPPC Reference Document on Best Available Techniques for Large Combustion Plants

Coal	22.18	94.6	39.0%	0.826
Lignite	6.87	90.9	39.0%	0.839
Fuel Oil	39.90	75.5	39.5%	0.688
Diesel	42.60	72.6	39.5%	0.662
LPG	0.00	61.6	39.5%	0.561
Naphtha	43.87	69.3	39.5%	0.632
Natural Gas	36.68	54.3	60.0%	0.326

Table 17. Net calorific values, generation efficiency and emission factor data used in calculations

Fuel Source	Electricity Generated (MWh)	EF	Share in Total Generation
Coal	1,125	0.826	2.5%
Lignite	11,482	0.826	25.1%
Fuel Oil	208	0.828	0.5%
Diesel oil	2	0.688	0.0%
LPG	50	0.662	0.1%
Naphtha	0	0.561	0.0%
Natural Gas	26,907	0.416	58.8%
Renewable and wastes	85	0.000	0.2%
Solid	5	0.000	0.0%
Total Renewable	5,912	0.000	12.9%
TURKEY'S TOTAL	45,776,3		100.0%

Table 18. Most recent capacity additions corresponding to 20%.[36,37,38,39,40]

36 http://www.teias.gov.tr/istat2004/7.xls

37 http://www.teias.gov.tr/istatistik2005/7.xls

38 http://www.teias.gov.tr/ist2006/8.xls

39 http://www.teias.gov.tr/ist2007/8.xls

40 http://www.teias.gov.tr/istatistik2008/8.xls

Annex 4

MONITORING INFORMATION

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

Annex 5

EIA APPROVAL LETTERS

T.C.
Çevre ve Orman
Bakanlığı

T.C.
KAHRAMANMARAŞ VALİLİĞİ
İL ÇEVRE VE ORMAN MÜDÜRLÜĞÜ

Karar Tarihi : 30/12/2009
Karar No : 2009/52

ÇEVRESEL ETKİ DEĞERLENDİRME BELGESİ

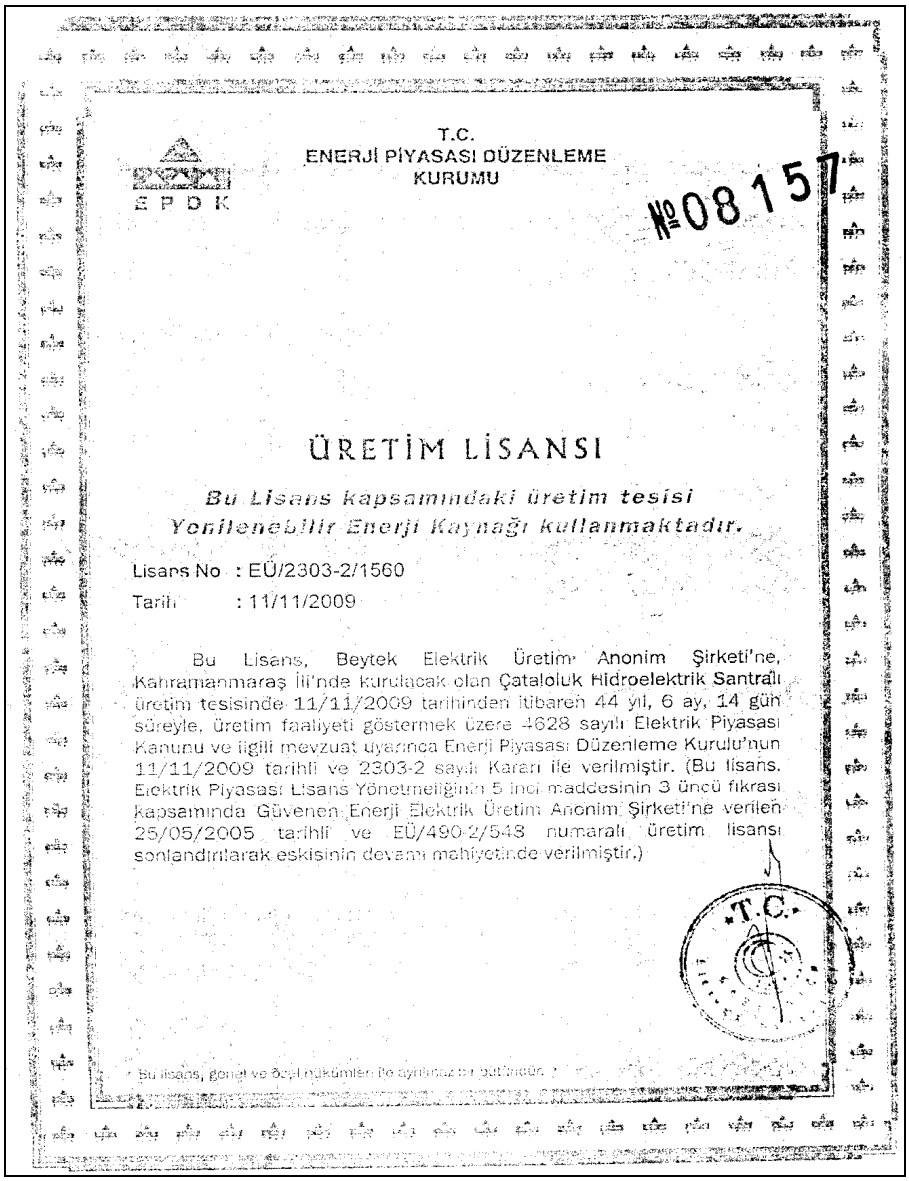
17 Temmuz 2008 tarih ve 26939 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği'nin Ek-II listesinde yer alan **"Çataloluk Regülatörü ve HES (9.84 MW)"** projesi ile ilgili olarak inceleme-değerlendirme yapılmış ve Proje Tanıtım Dosyasında çevresel etkilere karşı alınması öngörülen önlemler yeterli görülmüştür. Ayrıca ÇED Raporu hazırlanmasına gerek bulunmadığı tespit edilmiş olup, söz konusu projeye ÇED Yönetmeliğinin 17. Maddesi gereğince Valiliğimizce **"*Çevresel Etki Değerlendirmesi Gerekli Değildir Kararı*"** verilmiştir.

Hüseyin ÇANAK
Vali a.
İl Çevre ve Orman Müdürü

İşletme Alanı Koordinatları:
Koordinatlar arka sayfadadır.

Proje Sahibi : Beytek Elektrik Üretim A.Ş.
Projenin Yeri : Andırın İlçesi, Hızar ve Çataloluk Mevkii, Tekir Çayı Üzeri / KAHRAMANMARAŞ

Annex 6
GENERATION LICENCE



T.C.
ENERJİ PİYASASI DÜZENLEME KURUMU

EPDK

№08157

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi Yenilenebilir Enerji Kaynağı kullanmaktadır.

Lisans No : EÜ/2303-2/1560

Tarih : 11/11/2009

Bu Lisans, Beytek Elektrik Üretim Anonim Şirketi'ne, Kahramanmaraş İli'nde kurulacak olan Çataloluk Hidroelektrik Santralı üretim tesisinde 11/11/2009 tarihinden itibaren 44 yıl, 6 ay, 14 gün süreyle, üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 11/11/2009 tarihli ve 2303-2 sayılı Kararı ile verilmiştir. (Bu lisans, Elektrik Piyasası Lisans Yönetmeliğinin 5 inci maddesinin 3 üncü fıkrası kapsamında Güvenen Enerji Elektrik Üretim Anonim Şirketi'ne verilen 25/05/2005 tarihli ve EÜ/490-2/548 numaralı üretim lisansı sonlandırılarak eskisinin devamı mahiyetinde verilmiştir.)

T.C.

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