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

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Camlica II HEPP
Version number of the PDD	~~07~~0809
Completion date of the PDD	~~27/05/2015~~08/07/2015
Project participant(s)	Derin Enerji Üretim San. Ve Tic. AŞ (Project Owner) Global Tan Energy Ltd (Project Developer)
Host Party(ies)	Turkey
Sectoral scope and selected methodology(ies)	Sectoral scope 1: Energy Industries (Renewable-/non-renewable sources) Methodology: ACM0002 “Consolidated baseline methodology for grid connected electricity generation from renewable sources ver.13.0.0”
Estimated amount of annual average GHG emission reductions	49,436

SECTION A. Description of project activity
A.1. Purpose and general description of project activity

Çamlıca II Hydro Electrical Power Plant (HEPP) which was initially estimated to have a capacity of 15.4 MWe, was later designed as a 17.58 MWe capacity run-of-river type project which is built on river Zamantı. The main principle behind the project design is to make use of the elevation difference of 69m which is approximately 1500m away from the Çamlıca Village.

First design of the project which forms the basis of calculations and legal procedures had assumed an annual generation figure of 90.70 GWh/y. With the amended license the output capacity of the plant has been revised as 89.558 GWh/y and based on this figure, about 49,436 tCO2e emission reduction is estimated. Electricity generated within the project boundaries will be transferred to the national grid via Yamanlı Substation and relevant permissions are obtained.
Prior to project implementation, there exists only one hydro power plant which is Çamlıca I HEPP, located upstream. Thus, the water utilization of the project will not affect Çamlıca I HEPP. The project will utilize tail water from Çamlıca I Regulator and HEPP. Çamlıca I belongs to AYEN ENERJİ A.Ş. and it is a facility for the purpose of power generation. Çamlıca I HEPP has the installed capacity of 84MW and it has been operational since 1998. In the facility, the Zamantı river stream reaches from the water inlet structure to the surge tank by free-flow through 10,485 m tunnel and 915 m long penstock, passing through turbines at a power of 3x28 MW and converted to energy.[1]

Main purpose of the project is to produce clean, sustainable and environment-friendly energy. Since the project activity involves generating electricity from renewable natural resources, the risks it bears are considerably low and the project is designed in the most efficient way possible while keeping the local sources and nature unharmed. All the necessary and legally mandatory documents are obtained and environmental impact assessment proved that the project does not pose any threats for the nature.

Additionally, the project is expected to provide an impetus for the economic activities in the nearby regions, while increasing the awareness about environmental issues. The project is also expected to directly contribute to local area by creating job opportunities and improving know-how through trainings and site visits.

On the macro scale, project activities will result in expanding the share of renewables in the national energy pool and reduce the dependency on the imports which immediately translates into saving currency.

Milestone	**Date**
Water Right Utilization Agreement	03/01/2011
License Issuance	09/02/2011
EIA Exemption Letter	21/02/2011
Carbon Certification Proposal	08/06/2011
Project Consultancy Services Agreement	12/07/2011
Bank Loan Agreement*	25/07/2011
Construction Agreement	08/08/2011
Carbon Certification Agreement	20/10/2011
LSC Meeting	26/01/2012
Equipment Agreement	23/02/2012
Start of Construction*	01/05/2012
State Hydraulic Works Project Approval	27/12/2012
Ecosystem Assessment Report	24/04/2013
Revised Exemption from EIA Certificate	20/05/2013
System Connection Agreement	07/08/2013

[1] http://www.aydiner.com.tr/TR/images/Camlica_Hes_Insaati.pdf?tamamlanmis-projeler

Energy Transmission Line Approval	02/09/2013
Commissioning Date	02/05/2014

Table 1. Milestones for Camlica II HEPP

*~~Date of investment decision~~Project start date as per GS Toolkit and Requirements v2.1

A.2. Location of project activity

A.2.1. Host Party(ies)

TURKEY. Despite the fact that a legislation to ratify Kyoto Protocol dated 05/02/2009 was passed by Turkish Parliament, the host country still does not have a quantitative emission reduction commitment which makes it only eligible for VER projects.

A.2.2. Region/State/Province etc.

Project is located in central Anatolia within the boundaries of Kayseri province.

A.2.3. City/Town/Community etc.

Nearest settlement to the project site is Çamlıca village within the boundaries of Yahyalı district.

A.2.4. Physical/Geographical location

Project site located approximately 120 km away to the south of Kayseri city centrum.

Çamlıca II HEPP Geographic Coordinates	Latitude	Longitude
	37.9034788 N	35.4912182 E

Table 2: Project site weir coordinates

Figure 1: Çamlıca II HEPP Project Site

Structure	Latitude	Longitude
Tunnel Inlet-Outlet	37.9179036 - 37.9040153	35.4938434 - 35.4909861
Forebay	37.9045992 - 37.9045096	35.4910740 - 35.4910483

Table 3: Project main structures coordinates

Figure 2: Çamlıca II HEPP Project Site

A.3. Technologies and/or measures

Released water from Çamlıca II HEPP will be kept in the river basin. Water released from Çamlıca I HEPP will be transferred to the energy transmission channel by 1500m long and 50.00 m^3/sec capacity water transfer channel. At the 1347.50 m, the channel will be connected to the surge chamber and at the end of surge chamber water will be transferred to penstock. The penstock will continue until the generation area. 30 m^3/sec flow will enter the plant and the tail water will be transferred back to the river Zamanti. Even though, according to the initial estimations, gross energy output figure corresponds to 90.7 GWh, the project design was later finalised so that the annual electricity generation could be 89.558 GWh.[2]

Specifications for the built tunnel are as follows:

Tunnel length	1500 m
Progress rate	1.25m/shift
Average drilling rate	6 cm/d
Time allocated for drilling	40% shift (168d)
Cartridge diameter	2.5 cm
Geological formation	Limestone
Air Conditioning	Ventilation
Average length of sewage pit	1.40 m
Cross-sectional area of the tunnel	7.5 m^2
Holes per unit drilling area	2.2/m^2
Total holes	13
Unit amount of explosives	1.125 kg/m^3
Ventilation duration	15 min
Explosives per hole	0.65 kg/hole

Table 4: Tunnel Specifications

During the construction approximately 100,000 m^3 of excavation will be processed in two separate grinding units. All of the obtained materials will either be used in construction or stockpiled in appropriate storage areas. These areas are shown in the detailed project layout map.

[2] Camlica II Electricity Generation License

The energy from the power house will be transmitted to Camlica I substation by using a 154.00 kV 1 x 477.00 MCM line. Technical details of each unit that will be used in the project are given in the project introductory document.

Specifications for the used turbines are as follows:

Turbine Type	Francis
Total Installed Power	17.58 MWe
Total Number of Units	3 x (5.96 MWm/5.86MWe)
Gross Elevation	69m
Maximum Net Elevation	66m
Minimum Net Elevation	66m

Table 5: Turbine Specifications

The initial feasibility studies were made assuming the project will have a capacity of 15.4 MWe, but this figure was later amended as 17.58 MWe as confirmed by the generation license.

In order to protect and keep the lifeline water in its existing bed which leaves Camlica I, there will not be an additional regulator built for the Camlica II and the project will only use the water already used in Camlica I. In case the water is not enough for energy generation the official water usage agreement will be applied and the required lifeline water will be released to the river bed.
During the project existing roads will be used. In case of additional road requirements, all the needed permissions will be obtained from the governmental agencies.
The regulator will be built for the project. Thus, there will be a fish passage being built.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (host)	Derin Enerji Üretim San. Ve Tic. AŞ (Project Owner / Private Entity) Global Tan Enerji Ltd (Project Developer / Private Entity)	No

A.5. Public funding of project activity

No public funding is used for the project.

A.6. Debundling for project activity

Project is not fragmentation of a large project activity into smaller parts, hence there is no de-bundling involved.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

The UNFCCC approved baseline and monitoring methodology ACM0002, version 13.0.0[3] valid from 11/05/2012 was applied for the project activity.

ACM0002 refers to the following tools:

- "Tool for the demonstration and assessment of additionality", Version 07.0.0[4],and,
- ''Tool to calculate the emission factor for an electricity system'', Version 3.0[5]

B.2. Applicability of methodology

This methodology is applicable to grid-connected renewable power generation project activities that: (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).

The proposed project is a greenfield plant which will install a new power plant at a site where no renewable power plant was operated prior to the implementation of project activity.

The methodology is applicable as it satisfies the following conditions:

- The project activity is the installation of a hydro power plant/unit (with a run-of-river reservoir).
- The project does not involve capacity additions, retrofits or replacements.
- The project activity is implemented in an existing river bed, with no change in the volume of any of reservoirs
- The power density calculated for the entire project activity is greater than 4 W/m^2
- Project activities does not involve switching from fossil fuels to renewable energy sources at the site of the project activity,
- Project is not a biomass fired power plant;

Since the project is a hydro power plant one of the following conditions should be satisfied;

(a) The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or

(b) The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m^2; or

(c) The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m^2.

In case of Camlica-II HEPP, since the project is a run-of-river type hydro energy plant, it does not use multiple reservoirs, and satisfies the condition (a) where there is no change in the volume of any reservoirs.

[3] http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT
[4] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf/history_view
[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v3.0.0.pdf/history_view

B.3. Project boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Electricity Generation by the grid connected power plants	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source. Excluded for simplification
		N_2O	No	Minor emission source. Excluded for simplification
Project scenario	Emissions of CH_4 from the reservoir	CO_2	No	Minor emission source. Excluded for simplification as per the applied methodology
		CH_4	Yes	Main emission source. Calculated for determining significance.
		N_2O	No	Minor emission source. Excluded for simplification
	CO_2 emissions from combustion of fossil fuels for electricity generation	CO_2	No	Emissions from diesel generator are excluded as it is a minor emission source.
		CH_4	No	Minor emission source. Excluded for simplification
		N_2O	No	Minor emission source. Excluded for simplification
	Fugitive emissions	CO_2	No	Not taken into account as there are no fugitive emissions of CH_4 and CO_2 from non-condensable gases.
		CH_4	No	Not taken into account as there are no fugitive emissions of CH_4 and CO_2 from non-condensable gases.
		N_2O	No	Not taken into account as there are no fugitive emissions of CH_4 and CO_2 from non-condensable gases.
Leakage Emissions	Leakage emissions	CO_2	No	Upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.
		CH_4	No	Upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.
		N_2O	No	Upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.

“The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.” as per the applied methodology. In case of Camlica II HEPP, since all the power plants are connected to the national grid, the project boundary is defined as power plant components; three turbines, power house, weir, substation and the national grid.

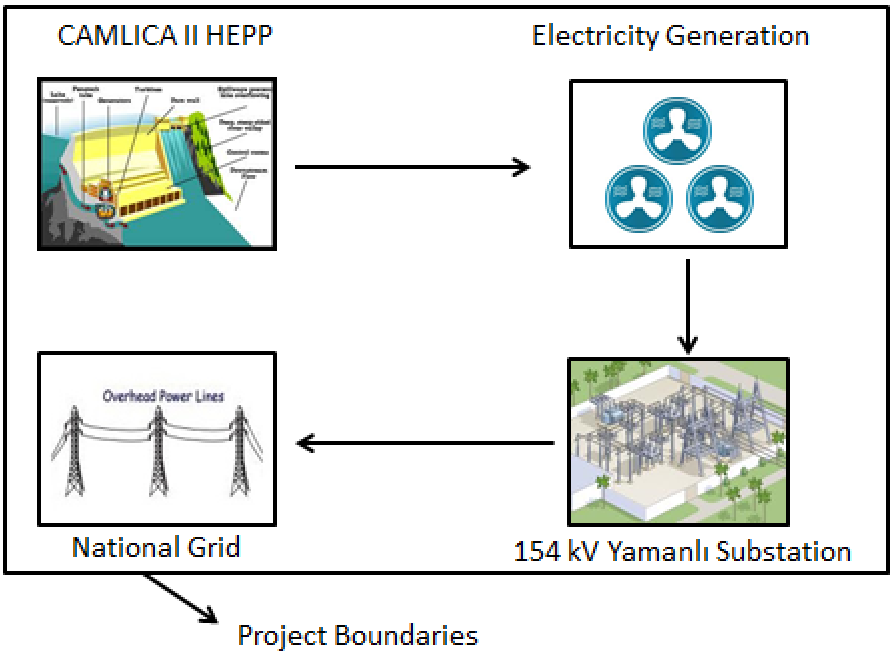

Figure 3: Project Boundaries

B.4. Establishment and description of baseline scenario

According to the methodology baseline scenario has been identified as "*the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources*".

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 whereas share of wind power plants are still very low. 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.

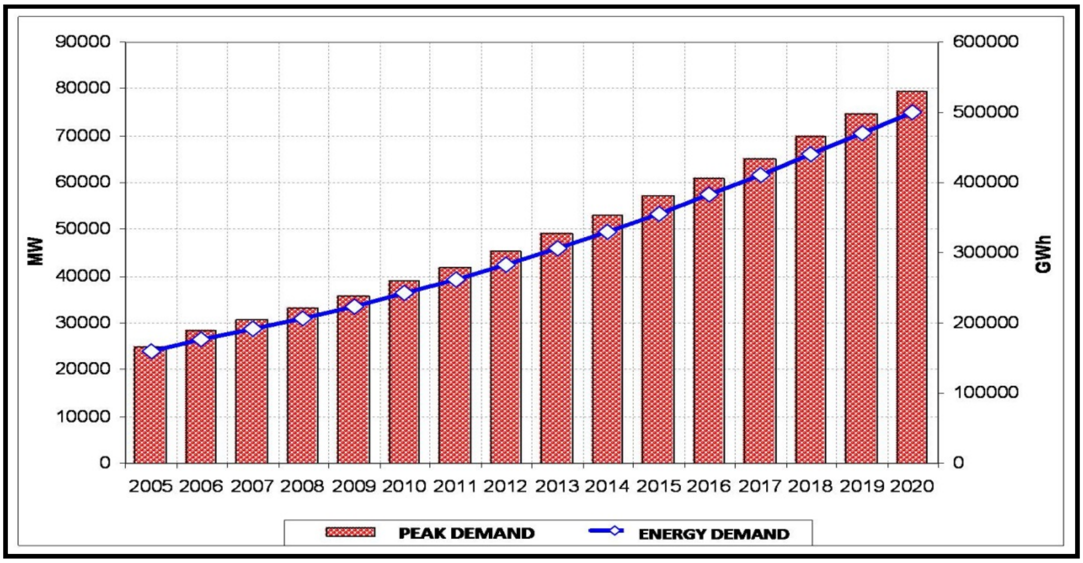

Figure 4. Peak Load and consumption projection for Turkish electricity system between 2005-2020[6]

According to the TEIAS statistics[7], share of WPPs together with geothermal power plants could hardly reach 1.68% in 2010 whereas share of thermal power plants is around 74-80% in recent years. When we look at the annual development of Turkey's gross generation in recent years we see that grid is dominated by thermal power plants and which is boosted by increasing energy demand in parallel to increase population and per capita income. Hence, baseline of Turkey's electricity grid will continue to be dominated by fossil fuel power plants which is seen as the quickest solution in short term to meet the demand and enable energy security in supply side.

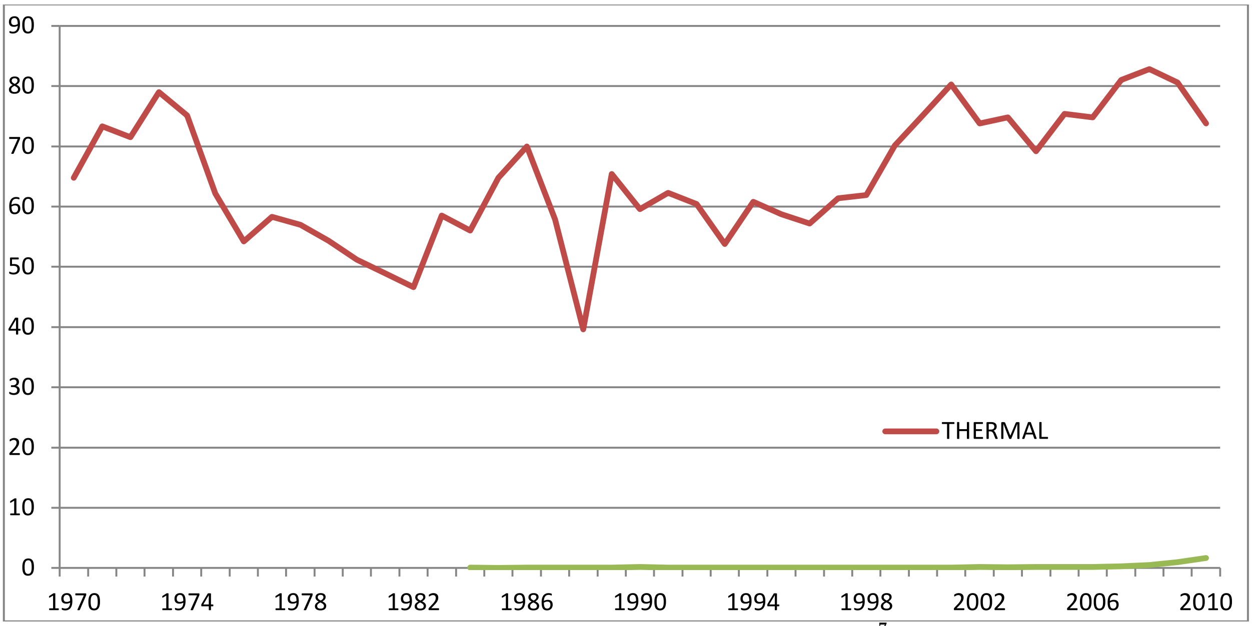

Figure 5. Annual Development of Turkey's Gross Generation Capacity[7]

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

7 http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/36.xls

B.5. Demonstration of additionality

According to the applied methodology (ACM0002) 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 89.558 GWh of electricity as per the early estimations and reduce about 49,436 tCO_2 emissions through replacing the electricity that would need to be supplied via the national grid in the absence of the project activity. 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:**

Since the baseline scenario is prescribed by the approved methodology alternative project activity scenarios are not discussed as per CDM VVS paragraphs 113 and 115.

Outcome of Step 1a

According to the methodology, baseline scenario has been identified as "*the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources*", which is the most plausible alternative to the project activity.

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

The following applicable mandatory laws and regulations have been identified:

1. Electricity Market Law[8]
2. Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[9]
3. Energy Efficiency Law [10]
4. Forest Law[11]
5. Environment Law[12]

The resultant alternative to the project as outlined in Step (1a) is in compliance with the applicable laws and regulations.

Outcome of Step 1b

Mandatory legislation and regulations for alternative scenario is 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. Therefore, the proposed VER project activity is considered as additional.

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

[9] Law number 5346, enactment date 18/05/2005 http://www.epdk.gov.tr/documents/10157/4b360128-53aa-4174-8104-a6c10434ac9c

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

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

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

Step 2 - Investment analysis

The investment analysis has been done in line with the "Guidelines on the assessment of investment analysis v.05" [13] and "Tool for the demonstration and assessment of additionality v.07.0.0". [14] The aim of the analysis is 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. A preliminary loan agreement has been signed for the project activity. Final loan agreement is expected to be signed after negotiations are finalized. For investment analysis, loan conditions have been determined considering the average market rates. Initial design capacity (15.4MWe) was used for the investment analysis as the investment decision was taken considering the initial conditions.

***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

For benchmark analysis, figure defined by World Bank for similar project types have been used which has been given as 15% [15] by a report generated in May 2009. For the proposed project, in order to reach this equity IRR values, average electricity tariff must be above 7.7 $c/kWh in the absence of carbon revenue and assuming that initial investment figures are realized so that the investment will become reasonable.

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

Parameters	Unit	Data Value
Installed Capacity	(MWm)MWe	(15.85)15.40[16]
Annual Grid Connected Output	GWh	90.70[17]
Capital Investment	Million $	31.39[18]
Income tax rate	%	20[19]
Expected Tariff	$ Cents/kWh	7.3[20]

[13] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf
[14] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
[15] Project Appraisal Document for a proposed IBRD Loan (page 81)
[16] Original Generation License
[17] Original license
[18] Investment Model submitted to DOE
[19] http://www.mmmb.org.tr/default.aspx?pid=24826&nid=16297
[20] http://www.epdk.gov.tr/documents/10157/4b360128-53aa-4174-8104-a6c10434ac9c

Expected VERs price	$/ tons CO_2e	6.5[21]
Operation&Maintenance Cost	$/Year	3,337,000[22]

Table 6. Main financial parameters used for investment analysis

Equity IRR has been selected as financial indicator as per the available information. Since the aim of the analysis is not to determine the viability of the project to service debt, project IRR indicator has not been selected. Equity IRR has been applied to demonstrate the return of investment without taking into account the loans and interest rate associated with it. Equity IRR has been calculated according to the tool as stated in the applied methodology. Electricity tariff has been used as $7.3 Cent/kWh. Annual generation has been taken as 90.70 GWh and maintenance cost has been estimated as $3,337,000. Investment decision date has been identified as the date of bank loan agreement. For depreciation calculations, expected life of construction and electromechanical equipment are determined as 40 years[23] and 25 years, respectively.[24] Calculation and estimations have been made conservatively therefore equity IRR value represents the most optimistic scenario in terms of capital investment and electricity generation. On the other hand electricity tariff is expected to increase so that the investment becomes attractive however as given below, expectations have not been realized yet due to the market conditions.

Expected return on investment for these types of projects should be above 15% as per WB document however, expectation of many investors is returns around 25% for successful investments for some investment funds. Even if we consider the minimum benchmark equity IRR which is 15%, for proposed project, in order to reach this equity IRR values, average electricity tariff must be above 7.7 $c/kWh in the absence of carbon revenue and assuming that initial investment figures are realized so that the investment will become reasonable.

For proposed project, equity IRR has been calculated as 12.66% in the absence of carbon revenue for the acquired licensed generation period. When we include the carbon revenue in the cash flow, equity IRR increases to 14.66% and the project becomes more attractive and viable 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. Expectation that the electricity prices will increase is the risk for investors whereas realization of this expectation will the premium. Carbon revenue has a significant affect in this respect in terms of decreasing the period for return on investment and risk of investment decision.

Following figure is given in order to reflect the actual electricity prices realized obtained from monthly reports of Market Settling and Balancing Center[25] between 01/12/2009-01/01/2012. 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 7.3 $cents per kWh (or 73 $/MWh) is a realistic scenario as demonstrated below.

[21] Tulletprebon newsletter
[22] Financial Model
[23] http://www.gib.gov.tr/fileadmin/mevzuatek/eski/verusulteb333ek.html
[24] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf
[25] http://pmum.teias.gov.tr/UzlasmaWeb/

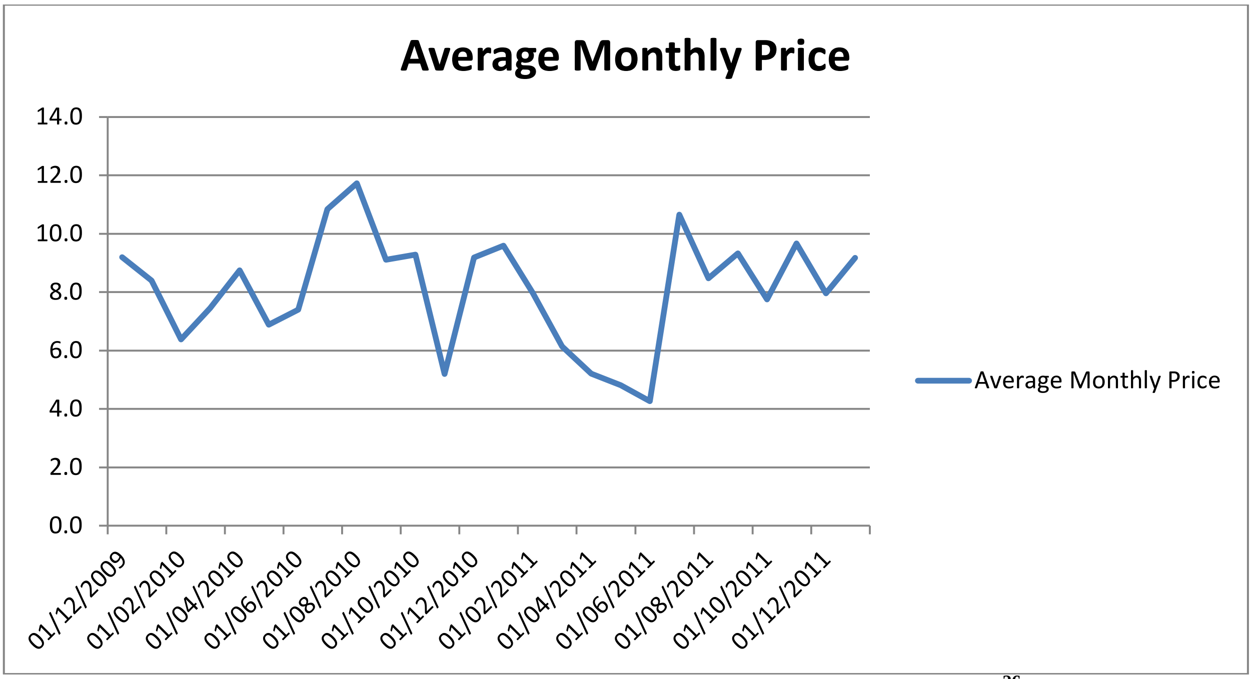

Figure 4. Highest tariffs observed between 01/12/2009-31/01/2012 ($ cents/kWh)[26]

This equity 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 the proposed project, in order to reach the benchmark equity IRR values, average electricity tariff must be above 7.7$ c/kWh so that the investment will become reasonable. Considering that control of hydro power plants during generation period is limited, 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.

Sub-step 2d - Sensitivity Analysis

Sensitivity analysis has been carried out for three main parameters identified which constitute all income and expenses of project effecting project return;

- Investment Cost
- Operating Cost
- Electricity Sales revenue

For a range of ±15% fluctuations in investment (construction and EM equipment) cost, operating cost and ±15% fluctuation in electricity income, table below has been obtained. Parameters have been selected as per the Guidelines on Investment analysis which are defined as investment cost, operation cost, changes in tariff and electricity production.[35]

	-15	-10	-5	0	5	10	15
Investment Cost	16.34	14.91	13.70	12.66%	11.75	10.95	10.24

[26] http://dgpys.teias.gov.tr/dgpys

Operation Cost	15.80	14.71	13.66	12.66%	11.69	10.76	9.86
	-15	**-10**	**-5**	**0**	**5**	**10**	**15**
Tariff	7.33	9.01	10.77	12.66%	14.69	16.91	19.35
Electricity Production	9.27	10.35	11.48	12.66%	13.89	15.19	16.56

Table 7. Sensitivity analysis for proposed project without carbon revenue

Outcome of Step 2:

The investment and sensitivity analysis shows that the VER revenues will improve the financial indicators of the Project remarkably. Considering that figures above are based on a higher price rather than the government guaranteed floor 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.

According to local regulations, electricity price is determined daily according to Market Financial Settlement Center (MFSC) as defined in the regulations and there exists three tariffs during day, peak and night hours. Thermal power plants and HEPPs with storage facilities have flexibility to schedule their generation at peak hours when the tariff is high. However, Wind power plants do not have storage facility therefore may not be able to benefit from high prices realized at when demand is high. According to MFSC figures, electricity tariff fluctuated between 4.3 $c/kWh and 10.2 $c/kWh between 01/12/2009 and 31/01/2012 whereas the weighted average of the tariff has been calculated as 8.1$c/kWh in this period[27]. Since this value shows the spot price at the time of selected investment decision date, it does not provide any guarantee about the actual selling price as the control on generation period and tariff is limited and it may not be possible to generate and sell electricity during peak tariff periods. Also, considering that fluctuation in water resources is high and fact that a part of the electricity can be sold through bilateral agreements to free consumers with a discount rate over market price, guarantee price has been taken as reference in investment analysis which also provides input for evaluation of financing institutions.

Another important parameter affecting equity IRR is investment cost. However, since the agreements have been made and costs are realized as given in financial model, there is no chance to expect a decrease in the investment cost. Operating costs can also affect the equity IRR however, its impact is not significant and does not cause any significant change in equity IRR and the fluctuation percentage to reach the benchmark is very high and not likely.

Based on the above information, it is seen that project is not the most attractive option. Therefore project is considered as additional to the baseline scenario.

Step 3. Barrier analysis

This step is not applied as the additionality is demonstrated in previous steps.

Step 4. Common Practice Analysis

[27] https://pmum.teias.gov.tr/UzlasmaWeb/

According to the “Tool for demonstration and assessment additionality (Version 07.0.0)”, the common practice shall provide an analysis of any other activities that are similar to the Project Activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing etc.
Annex-8 , Guidelines on Common Practice version 02.0 has been followed.[28]

Sub-Step 4.1:Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

The design capacity of the proposed project is 15.4 MWe at time of investment decision. Therefore, the applicable output range is from 7.7 MW to 23.1 MW

***Sub-Step 4.2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM project activities and projects activities undergoing validation shall not be included in this step*:**

All power plants that have same capacity, within the range 7.7 MW to 23.1 MW[29] has been listed in common practice excel sheet. Properties of the power plants are also indicated in this excel sheet. After excluding the VER projects, there exist 46 power plants being operated in Turkey. These power plants have been operational before the start date of the proposed project.
Therefore;

N_{all}=46

Sub-Step 4.3: Within plants identified in Step 3, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

It has been determined that, all hydro power plants except ERENKOY HPP, SUMER HPP, YUKARI MANAHOZ HPP, KULP I HPP, SARMAŞIK I HPP, SARMAŞIK II HPP and YAVUZ HPP applied different technologies in terms of investment models compared to the proposed project and these three power plants were excluded from the list in order to follow a conservative approach since there was no available information regarding their applied technologies. Among the companies taken into consideration, for example in BOT (build-operate-transfer) type of projects, project owner receives a concession from public to finance, construct, operate, and they have a different financial model. List of the power plants is tabulated below:

No	Hydroenergy Plant	Installed Capacity	License Type	Project Status
1	BERDAN	10.2	EUAS	Different Investment Model
2	KISIK	9.3	EUAS	Different Investment Model
3	ÇAĞ-ÇAĞ(NAS EN.)	14,4	Transfer of Operational Rights	Different Investment Model
4	KOVADA-I(BATIÇİM EN.)	8,3	Transfer of	Different Investment Model

[28] http://cdm.unfccc.int/Reference/Guidclarif/meth/meth_guid44.pdf
[29] http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf

			Operational Rights	
5	AKSU (ÇAYKÖY)	16,0	BOT	Different Investment Model
6	FETHİYE	16,5	BOT	Different Investment Model
7	GAZİLER (Iğdır)	11,2	BOT	Different Investment Model
8	GİRLEVİK-II / MERCAN	11,0	BOT	Different Investment Model
9	GÖNEN	10,6	BOT	Different Investment Model
10	TOHMA MEDİK (ALARKO)	12,5	BOT	Different Investment Model
11	BAYBURT HES	14,6	GENERATION COMPANY	Different Scale
12	BALKONDU I HES (BTA ELEK.)	9,2	GENERATION COMPANY	Different Scale
13	BEREKET (FESLEK)	9,5	GENERATION COMPANY	Different Scale
14	BEREKET (GÖKYAR)	11,6	GENERATION COMPANY	Different Scale
15	ÇAMLIKAYA	8,5	GENERATION COMPANY	Different Scale
16	ÇANAKÇI HES (CAN EN.)	9,3	GENERATION COMPANY	Different Scale
17	ÇEŞMEBAŞI (GİMAK)	8,2	GENERATION COMPANY	Different Scale
18	ENERJİ-SA-AKSU-ŞAHMALLAR	14,0	GENERATION COMPANY	Different Scale
19	ENERJİ SA-SUGÖZÜ-KIZILDÜZ	15,4	GENERATION COMPANY	Built as BOT , Different Investment Model
20	ERENKÖY REG.(TÜRKERLER)	21,5	GENERATION COMPANY	No Info Available
21	ERVA KABACA HES	8,5	GENERATION COMPANY	Different Scale
22	FIRTINA ELEK.(SÜMER HES)	21,6	GENERATION COMPANY	No Info Available
23	GÖK HES	10,0	GENERATION COMPANY	Different Scale
24	H.G.M.ENER.(KEKLİCEK HES)	8,7	GENERATION COMPANY	Different Scale
25	HİDRO KONTROL YUKARI MANAHOZ	22,4	GENERATION COMPANY	No Info Available
26	İÇ-EN ELEK. ÇALKIŞLA	7,7	GENERATION COMPANY	Different Scale
27	İÇTAŞ YUKARI MERCAN	14,2	GENERATION COMPANY	Different Scale
28	KAREL (PAMUKOVA)	9,3	GENERATION COMPANY	Different Scale
29	KAYEN ALFA EN.KALETEPE HES (tortum)	10,2	GENERATION COMPANY	Different Scale
30	KAZANKAYA REG.İNCESU HES(AKSA)	15,0	GENERATION COMPANY	Different Scale
31	KULP I HES (YILDIZLAR EN.)	22,9	GENERATION COMPANY	No Info Available
32	KULP IV HES (YILDIZLAR EN.)	12,3	GENERATION COMPANY	Different Scale
33	ÖZGÜR ELEKTR.K.Maraş Tahta HES	12,5	GENERATION COMPANY	Different Scale
34	SARMAŞIK I HES (FETAŞ FETHİYE ENERJİ)	21,0	GENERATION COMPANY	No Info Available
35	SARMAŞIK II HES (FETAŞ FETHİYE ENERJİ)	21,6	GENERATION COMPANY	No Info Available
36	SARIKAVAK (ESER)	8,1	GENERATION COMPANY	Different Scale
37	ÜZÜMLÜ HES (AKGÜN EN. ÜR. VE TİC. A.Ş.)	11,4	GENERATION COMPANY	Different Scale
38	YEDİGÖL REG. VE HES (YEDİGÖL HES)	21,9	GENERATION COMPANY	Built by EIE , Different Investment Model
39	YAPISAN HACILAR DARENDE	13,3	GENERATION COMPANY	Different Scale
40	YAVUZ HES (MASAT EN.)	22,5	GENERATION COMPANY	No Info Available

41	BEYKÖY ZORLU	16,8	GENERATION COMPANY	Built By DSI. Privatized in 2008
42	KUZGUN ZORLU	20,9	GENERATION COMPANY	Built By DSI. Privatized in 2009
43	TERCAN ZORLU	15,0	GENERATION COMPANY	Built By DSI. Privatized in 2010
44	ÇILDIR ZORLU	15,4	GENERATION COMPANY	Built By DSI. Privatized in 2011
45	İKİZDERE ZORLU	18,6	GENERATION COMPANY	Built By DSI. Privatized in 2012
46	MERCAN ZORLU	20,4	GENERATION COMPANY	Built By DSI. Privatized in 2013

Therefore;

N_{diff}=39

Sub-Step 4.4: Calculate factor F=1-N_{diff}/N_{all} representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity

$$F=1-N_{diff}/N_{all}=1-(39/46) = 0.152 \qquad (< 0.2)$$

According to the "Tool for the Demonstration and Assessment of Additionality" (version 06.0.0), if the factor F is greater than 0.2 and N_{all}-N_{diff} is greater than 3, then the proposed project is a "common practice".
For the proposed project, F=0.152, therefore, the proposed project is not a common practice within the region. Hence, the proposed project is additional.

Given the fact that there aren't many known plants similar to the proposed project and built without carbon revenue, the proposed type of project should not be considered as a common practice in Turkey.

In order to assess the additionality of the project with the revised capacity (17.58 MWe), common practice analysis was repeated using the applicable range of 8.8MWe-26.4MWe and F factor found to be 0.167. Complete list of plants and associated calculations were submitted to the DOE to prevent contradictions. The project activity is not a common practice in any case.

B.6. Emission reductions
B.6.1. Explanation of methodological choices

Emission factor has been calculated conservatively 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", 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.

ANNUAL DEVELOPMENT OF GENERATION IN TURKEY					
	GENERATION				
YEARS	THERMAL	HYDRO	GEOTHERM.WIND	TOTAL(GWh)	% Low Cost Must Run
1970	5590.2	3032.8	0	8623.0	35%
1971	7170.9	2610.2	0	9781.1	27%
1972	8037.7	3204.2	0	11241.9	29%
1973	9821.8	2603.4	0	12425.2	21%
1974	10121.2	3355.8	0	13477.0	25%
1975	9719.2	5903.6	0	15622.8	38%
1976	9908.0	8374.8	0	18282.8	46%
1977	11972.3	8592.3	0	20564.6	42%
1978	12391.3	9334.8	0	21726.1	43%
1979	12218.3	10303.6	0	22521.9	46%
1980	11927.2	11348.2	0	23275.4	49%
1981	12056.7	12616.1	0	24672.8	51%
1982	12384.8	14166.7	0	26551.5	53%
1983	16004.1	11342.7	0	27346.8	41%
1984	17165.1	13426.3	22.1	30613.5	44%
1985	22168.0	12044.9	6.0	34218.9	35%
1986	27778.6	11872.6	43.6	39694.8	30%
1987	25677.2	18617.8	57.9	44352.9	42%
1988	19030.8	28949.6	68.4	48048.8	60%
1989	34041.0	17939.6	62.6	52043.2	35%
1990	34314.9	23148.0	80.1	57543.0	40%
1991	37481.7	22683.3	81.3	60246.3	38%
1992	40704.6	26568.0	69.6	67342.2	40%
1993	39779.0	33950.9	77.6	73807.5	46%
1994	47656.7	30585.9	79.1	78321.7	39%
1995	50620.5	35540.9	86.0	86247.4	41%
1996	54302.8	40475.2	83.7	94861.7	43%
1997	63396.9	39816.1	82.8	103295.8	39%
1998	68702.9	42229.0	90.5	111022.4	38%
1999	81661.0	34677.5	101.4	116439.9	30%
2000	93934.2	30878.5	108.9	124921.6	25%
2001	98562.8	24009.9	152.0	122724.7	20%
2002	95563.1	33683.8	152.6	129399.5	26%
2003	105101.0	35329.5	150.0	140580.5	25%
2004	104463.7	46083.7	150.9	150698.3	31%
2005	122242.3	39560.5	153.4	161956.2	25%
2006	131835.1	44244.2	220.5	176299.8	25%
2007	155196.2	35850.8	511.1	191558.1	19%
2008	164139.3	33269.8	1008.9	198418.0	17%

2009	156923.4	35958.4	1931.1	194812.9	19%
2010	155827.6	51795.5	3584.6	211207.7	26%
2011	171638.3	52338.6	5418.2	229395.1	25%

Table 8. Breakdown by source of the electricity generation[30],

The methodology has been applied in a conservative manner. Tools addressed by the applied methodology have been used to calculate baseline, project and leakage emissions. The equations used are ;

- $$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,y} * NCV_{i,y} * EF_{CO_2,i.y}}{EG_y}$$
- $\boxed{\mathbf{EF}_{grid,\ BM,\ y} = \sum \mathbf{EG}_{,m,y}\ .\ \mathbf{EF}_{EL,m,y} / \sum \mathbf{EG}_{,m,y}}$
- $\boxed{\mathbf{EF}_{grid,\ CM,\ y} = \mathbf{w}_{OM} * \mathbf{EF}_{grid,\ OM,\ y} + \mathbf{w}_{BM} * \mathbf{EF}_{grid,\ BM,\ y}}$
- $ERy = BEy - PEy - LEy \qquad (4)$
- $BE_y = EG_y \times EF_y$
- $PD = \underline{Cap_{PJ} - Cap_{BL}} / \ (A_{PJ} - A_{BL})$

Table 9. Equations used for baseline calculations

[30] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kgucunkullan%C4%B1m(13-21)/13.xls

B.6.2. Data and parameters fixed ex ante

Data / Parameter	**EG_{y},**
Unit	GWh
Description	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must run power plants in year y
Source of data	Gross generation electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must run power plants in year y [31] Net generation and imported electricity [32] [33]
Value(s) applied	<table><tr><td>Year</td><td>Amount</td></tr><tr><td>2009</td><td>150,333</td></tr><tr><td>2010</td><td>149,750</td></tr><tr><td>2011</td><td>162,713</td></tr></table> 462,796 GWh between 2009-2011
Choice of data or Measurement methods and procedures	Data from Grid Operator has been used
Purpose of data	Data used for emission reduction calculation (for calculation of OM, Net-to-Gross electricity ratio and share of low-cost must-run sources)
Additional comment	-

[31] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kgucunkullan%C4%B1m(13-21)/13.xls
[32] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/23.xls
[33] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls

Data / Parameter	$EF_{CO2, i, y\ i}$
Unit	tCO_2/TJ
Description	CO_2 emission factor of fossil fuel type "i" in year "y"
Source of data	-For EF of fossil fuels, IPCC values at the lower limit have been used.
Value(s) applied	**Fuel Source** / **EF(tCO2/Tj)** Coal: 89.5 Lignite: 90.9 Fuel Oil: 75.5 Diesel: 72.6 LPG: 61.6 Naphtha: 69.3 Natural Gas: 54.3
Choice of data or Measurement methods and procedures	According to the applied tool, 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.
Purpose of data	EF calculations
Additional comment	-

Fuel Source	EF(tCO2/Tj)
Coal	89.5
Lignite	90.9
Fuel Oil	75.5
Diesel	72.6
LPG	61.6
Naphtha	69.3
Natural Gas	54.3

Data / Parameter	$NCV_{i,y}$
Unit	Tj/kt
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	TEIAS statistics[34]
Value(s) applied	<table><tr><th></th><th>Weighted Average for years 2009 , 2010 , 2011</th></tr><tr><td>Hard Coal</td><td>22.49</td></tr><tr><td>Lignite</td><td>6.94</td></tr><tr><td>Fuel Oil</td><td>40.25</td></tr><tr><td>Diesel Oil</td><td>42.49</td></tr><tr><td>LPG</td><td>46.47</td></tr><tr><td>Naphta</td><td>37.36</td></tr><tr><td>Natural Gas</td><td>37.22</td></tr></table>
Choice of data or Measurement methods and procedures	Data has been calculated from Grid Operator's(TEIAS) statistics. Consumed amount of fuel was divided by the obtained energy to determine NCV of each type.
Purpose of data	Data used for OM and BM calculation
Additional comment	-

Data / Parameter	Cap_{BL}
Unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity
Source of data	Project site
Value(s) applied	0
Choice of data or Measurement methods and procedures	As the hydro power plant is new this value is 0
Additional comment	-

[34] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls

Data / Parameter	A_{BL}
Unit	m^2
Description	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full
Source of data	Project site
Value(s) applied	0
Choice of data or Measurement methods and procedures	As the hydro power plant is new this value is 0
Additional comment	-

Data / Parameter	$FC_{i,y}$
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	TEIAS Statistics[35,36]
Value(s) applied	(see table below)
Choice of data or Measurement methods and procedures	Data from Grid Operator has been used
Purpose of data	Data used for OM calculation
Additional comment	-

Fuel Type	$FC_{i,y}$ unit [Ton, except for Natural Gas (NG) (1000 m^3)] 2009	2010	2011	Total
Hard Coal	6,621,177	7,419,703	10,574,434	24,615,314
Lignite	63,620,518	56,689,392	61,507,310	181,817,220
Fuel Oil	1,594,321	891,782	531,608	3,017,711
Diesel Oil	180,857	20,354	15,047	216,258
LPG	111	0	0	111
Naphtha	8,077	13,140	0	21,217
Natural Gas	17,034,548	20,457,793	21,607,635	59,099,976

35 http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls

36 http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/49.xls

<table>
<tr><td>Data / Parameter</td><td>$\eta_{m,y}$</td></tr>
<tr><td>Unit</td><td>-</td></tr>
<tr><td>Description</td><td>Average net energy conversion efficiency of power unit m or k in year y</td></tr>
<tr><td>Source of data</td><td>Appendix 1. Default efficiency factors for power plants of Tool to calculate the emission factor for an electricity system Version 03.0.0</td></tr>
<tr><td>Value(s) applied</td><td><table>
<tr><th></th><th>Generation Efficiency</th></tr>
<tr><td>Coal</td><td>39.0%</td></tr>
<tr><td>Lignite</td><td>39.0%</td></tr>
<tr><td>Fuel Oil</td><td>39.5%</td></tr>
<tr><td>Diesel</td><td>39.5%</td></tr>
<tr><td>LPG</td><td>39.5%</td></tr>
<tr><td>Naphtha</td><td>39.5%</td></tr>
<tr><td>Natural Gas</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>Default values are used as a conservative approach.</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

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. Identify the relevant electricity systems

According to the ‘‘Tool to calculate the emission factor for an electricity system’’, Version 03, 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.

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.

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 2009 – 2011, 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 renewable 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:

$$EF_{Grid,OM\ simple,y} = \sum FC_{i,y} * NCV_{i,y} * EF_{CO2,i,y} / EG_y \qquad \textbf{(1)}$$

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[37,38], 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	**2009**	**2010**	**2011**	**Total**
Hard Coal	6,621,177	7,419,703	10,574,434	24,615,314
Lignite	63,620,518	56,689,392	61,507,310	181,817,220
Fuel Oil	1,594,321	891,782	531,608	3,017,711
Diesel Oil	180,857	20,354	15,047	216,258
LPG	111	0	0	111
Naphtha	8,077	13,140	0	21,217
Natural Gas	17,034,548	20,457,793	21,607,635	59,099,976

Table 10. 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.

	COEF (tCO_2/kt)	**Total fuel Consumption** (tons or 1000m^3)	**Total Emissions (tCO_2)**
Coal	2,013	24,615,314	49,554,106
Lignite	631	181,817,220	114,711,446
Fuel Oil	3,039	3,017,711	9,169,812
Diesel Oil	3,085	216,258	667,131
LPG	2,863	111	318
Naphtha	2,589	21,217	54,933
Natural Gas	2,021	59,099,976	119,432,554
Total Emissions			293,590,299

[37] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls

[38] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/49.xls

Table 11. 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. 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. 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 Gen. Thermal[39]	Internal Consumption[40]	Net Gen. Thermal	Import	Total Supply to the Grid (GWh)
2009	156,923	*4.2%*	150,333	812	151,145
2010	155,828	*3.9%*	149,750	1,144	150,894
2011	171,638	*5.2%*	162,713	4,556	167,269
	Total Net Thermal Gen.		462,796	6,512	469,308

Table 12Gross/Net electricity generation by Turkish Grid[41]

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;

$\mathbf{EF}_{grid, OM, y}$ = **293,590,299** tCO_2 / 469,308,686 MWh
= **0.626 tCO_2/MWh.**

In calculating the $EF_{grid, OM ,y}$, data for NCV has been calculated using weighted average values for each fuel.

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

In terms of vintage of data, project participants can choose between one of the following two options to calculate EF_{grid}, BM,$_y$:
Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be

[39] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/29(06-2011).xls
[40] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls
[41] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls

calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

In this PDD, **Option1** is chosen to calculate the build margin emission factor. The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities that started to supply electricity to the grid most recently (SET5-units) and determine their annual electricity generation (AEGSET-5-units, in MWh);

Since data is not available anymore showing the commissioning dates of the plants, those were not tabulated. However, when we look at the plants commissioned in 2011, we see that even we choose the five plants with highest capacity; still total capacity of AEGSET 5 is less than 20% of the AEGtotal.

List of five plants with largest capacity commissioned in 2011	Type of Fuel	Commissioning Date	Generation Capacity (MWh)
BEKIRLI TES (ICDAS).	COAL	2011	4,320
ALKUMRU	HEPP	2011	828
CENGIZ	Natural Gas	2011	985
AKSA SAMSUN	Natural Gas	2011	980
NUH ENERJI	Natural Gas	2011	900
			8,013

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

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[42,43]. For determination of plants that comprise 20% of the system's generation, gross generation in year 2011 which is 229,365.1 GWh has been taken as reference and its 20% has been determined as about 42,726 GWh after excluding 15,762.8GWh generation from plants benefiting from VER revenue. Since no data is available on actual commissioning date of the plant, plants commissioned in 2011 were fully included in the calculations. Thus, total capacity included in BM calculation has increased to 54,546 GWh.

(c) From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation (SETsample); Identify the date when the power units in SETsample started to supply electricity to the grid. If none of the power units in SETsample started to supply electricity to the grid more than 10 years ago, then use SETsample to calculate the build margin. In this case ignore steps (d), (e) and (f).

42 http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kguc(1-12)/8.xls

43 http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf

SET≥20% is selected as (SETsample) because the set of power units that comprises the larger annual electricity generation. There is no power units in SETsample started to supply electricity to the grid more than 10 years ago. Therefore the steps (d), (e) and (f) are ignored.

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:

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

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, Naphtha etc. all of the plants consuming liquid fuels have been considered as open cycle plants. Plants using lignite and coal have been assumed as using 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[44] and corresponding electricity generation 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	61.60	39.5%	0.561
Naphtha	69.30	39.5%	0.632
Natural Gas	54.30	60.0%	0.326

Table 13 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. 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.

[44] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/49.xls

	Generation- MWh	EF -tCO2/MWh	Emissions(tCO2)
Coal	15,323.3	0.826	12,659
Lignite	184.0	0.839	154
Fuel Oil	1,485.0	0.688	1,022
Diesel	0.0	0.662	-
LPG	0.0	0.561	-
Naphtha	0.0	0.632	-
Natural Gas	37,553.8	0.326	12,235
		Total	**26,071**

Table 14 Most recent capacity additions by fuel source

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

$$\mathbf{EF_{grid,\ BM,\ y}} = 26{,}071\ tCO_2 / 54{,}546\ MWh$$
$$= \mathbf{0.478\ tCO_2/MWh}$$

STEP 6 - Calculate the combined margin (CM) emission factor

As per the , weighted average baseline emission factor is calculated as follows;

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

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;

$$\mathbf{EF_{grid,\ CM,\ y}} = 0.50 * 0.626 + 0.50 * 0.478 = \mathbf{0.552}$$

The combined margin emission factor is therefore **0.552 tCO_2/MWh.** Emission factor will remain same during the first crediting period as recommended by the methodology.

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

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

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

Baseline emissions are calculated by equation (6) of the applied methodology:

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

$BE_y = 89{,}558 \times 0.552 = 49{,}436\ tCO_2/yr$ (rounded down conservatively)

Where;

BEy = Baseline emissions in year *y* (t CO_2/yr)

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

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (t CO_2/MWh)

Project emissions

For hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, project emissions calculations involve CH_4 and CO_2 emissions from the reservoirs, ($PE_{HP,y}$) and estimated as follows:
If the power density (PD) of the project activities is greater than 10 W/m^2 ; Project Emissions $PE_{HP,y} = 0$

Power density 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 single or multiple reservoirs 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 single or multiple reservoirs 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

$$PD = \frac{17{,}580{,}000 \ - 0}{10{,}091.016 - 0} = 1742.14 \text{ W/m2}$$

Since 1742.14 W/m^2 is far greater than 10 W/m^2 , project emissions are considered 0.

Leakage

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected
Also the energy generating equipment is not transferred from or to another activity. Therefore leakage is considered as “0”.

$$LE_y = 0$$

As a result: Total Emission Reduction is;

$$ER\text{y} = BE\ y$$

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2014 (02/05/2014–31/12/2014)	32,957	0	0	32,957
2015	49,436	0	0	49,436
2016	49,436	0	0	49,436
2017	49,436	0	0	49,436
2018	49,436	0	0	49,436
2019	49,436	0	0	49,436
2020	49,436	0	0	49,436
2021 (01/01/2021-30/04/2021)	16,479	0	0	16,479
Total	346,052	0	0	346,052
Total number of crediting years	7 years			
Annual average over the crediting period	49,436	0	0	49,436

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility, y}$
Unit	MWh/y
Description	Net Electricity generated and delivered to the grid by the project in year y
Source of data	Records from the metering devices used in the power plant will be used to calculate the annual generation of energy. PMUM records will be used as a cross-check both for generation and internal consumption.
Value(s) applied	Estimated annual generation forming the basis for emission reduction calculation is 89,558 MWh/y
Measurement methods and procedures	Generation data will be recorded by two metering devices continuously. These records will provide the data for the monthly invoicing to TEIAS. Generation will be recorded via remote reading system. This record will form the basis for monthly invoicing.
Monitoring frequency	Continuous measuring and monthly recording
QA/QC procedures	Two calibrated ammeters will back up each other. Maintenance and calibration of the metering devices will be made by TEIAS. 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. The meters should comply with EPDK regulations which define the accuracy class of the meters as 0.2 or 0.5 depending on the capacity of the circuit as given in document in link (http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44)
Purpose of data	Emission Reduction calculations
Additional comment	-

Data / Parameter	Cap_{PJ}
Unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site, equipment agreements or project license
Value(s) applied	17,580,000
Measurement methods and procedures	Checking project documents and equipment labels
Monitoring frequency	Yearly
QA/QC procedures	-
Purpose of data	Ensuring validity of project documentation
Additional comment	-

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest available version of the "Tool to calculate the emission factor for an electricity system"
Source of data	As per the "Tool to calculate the emission factor for an electricity system"
Value(s) applied	0.552
Choice of data or Measurement methods and procedures	As per the "Tool to calculate the emission factor for an electricity system"
Additional comment	-

Data / Parameter	A_{PJ}
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	Project site
Value(s) applied	0
Measurement methods and procedures	Measured from topographical surveys or maps
Monitoring frequency	Yearly
QA/QC procedures	-
Purpose of data	Maximum area is already calculated in feasibility report and considered in calculations. Annual measurements are not expected to be higher than this value.
Additional comment	-

B.7.2. Sampling plan

N/A

B.7.3. Other elements of 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.

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 generation and consumption.
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(through remote reading). 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. ISVM (Electricity fed to the grid)and UECM(Electricity consumed from the grid) data given in PMUM records will be used for cross checking of emission reduction calculations.

All data will be kept for at least two years after the crediting period for QA/QC purposes.

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.

SECTION C. Duration and crediting period
C.1. Duration of project activity
C.1.1. Start date of project activity

Start date of project activity is determined as ~~25/07/2011~~01/05/2012, ~~date of bank loan agreement~~start of construction activities.

C.1.2. Expected operational lifetime of project activity

The expected operational lifetime of the project is about 44 years as per the license issued. According to the lifetime of turbines which is estimated as 150,000 hours, lifetime of turbines will be about 25 years if operated at full time. Turbines will be renovated or replaced later. Project will be delivered to government authority at no cost at the end of license period.

C.2. Crediting period of project activity
C.2.1. Type of crediting period

Project will use 2 times renewable crediting period. (1st period)

C.2.2. Start date of crediting period

02/05/2014

C.2.3. Length of crediting period

First crediting period will be valid for seven years.

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts

A Project Identification File has been prepared for Camlica II project by Gökoğuzlar Mühendislik on November 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 economic impacts, any natural and historical protected areas within the project boundaries, assessment of geological and seismic aspects of the project site has been considered.

This Report has been evaluated by Province Directorate of Environment and Forestry. After evaluation of the project and comments of the local agencies, on 21/02/2011, Directorate has decided that no detailed EIA is required for the project activities. The EIA not required certificate is given in Annex 5

Also, since the project is a run-of-river type hydroelectric 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-of- 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

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

Local Stakeholder Meeting for Çamlıca II HEPP was held at 10:30 am on 26/01/2012 in Çamlıca Village Meeting Hall at Yahyalı District of Kayseri Province in Turkey. The meeting was organized in line with the Gold Standard requirements. The stakeholders and the list of invitation are identified accordingly. The meeting covered all agenda items recommended by the Gold Standard.

Agenda

Venue: Çamlıca Village Meeting Hall
10:30-11:50 Opening and Introduction of the project
11:50 - 12:10 Climate Change and Carbon Markets
12:10 -13:50 Question and Answers
13:50 -14:05 Blind SD Exercise and discussion on monitoring
14:05 -14:35 Evaluation and feedback session
15:00 Closure

E.2. Summary of comments received

Meeting has been done at Çamlıca village meeting hall in 26/01/2012 with 36 participant attendance. There were four female participants in the meeting.
In the meeting at village hall, Kemal Demirkol managing director from GTE gave a brief opening speech and introduced project representatives Mr Tamer from Derin Enerji Üretim San. Ve Tic. AŞ introduced the project to the locals and gave information about the project. After that Mr Kemal gave information about climate change, global warming and its effects on environment and on daily life. Also he mentioned the benefits of the project on climate change. After that the questions from villagers were answered.
The questions were mostly about land use and contributions to the village. Local people in the village generally asked if there would be additional job opportunities for them and wanted to know the direct and indirect effects of the project on their village. All the relevant answers were given as presented in the LSC report and the local people were explained that the project owner will be informed about their all needs for the village.

E.3. Report on consideration of comments received

Stakeholder comment	**Was comment taken into account (Yes/ No)?**	**Explanation (Why? How?)**
What is the adverse and inverse effect of this project to the locals? Is it possible to provide electricity by transferring the produced	YES	The produced energy voltage is not suitable for daily usage. In order to do that, there should be other transmission station which

energy? Will the project owner meet the needs of village?		is not possible and feasible. The produced energy will be transferred to the transmission line, then transformer station and then to the energy pool for to be transferred all over Turkey. In other word, the daily voltage level and produced electricity voltage is different, therefore it is not possible.
Locals want Derin Energy to provide water for irrigation by pumping water to irrigation pool. Also common expectation from the project owner is to provide minaret for the village mosque.	YES	All the expectations are shared with project owner.
How the explosions will be done? If there is damage due to explosions, how the project owner will compensate?	YES	In order to prevent the possibilities of any damage, all the cautions required will be taken in the related regulations. If there is any damage due to explosive activities, then the project owner will compensate it by constructing the damaged areas better than old version.
Does the high voltage line affect vegetation?	YES	No, it doesn't have any effect on vegetation. Project owner cannot decide the route of the high voltage transmission line. The legal authorities will decide that. And there is no way of the high voltage line to pass over houses. Project owner is limited by the regulations.
Who is going to tell or test if the present voltage is harmful or not?	YES	Locals can apply to Universities related areas for this topic. Also this

		request reported to the project owner to cover the possible costs of measurements will be done by the experts.

SECTION F. Approval and authorization

Project is developed as a VER project. Since Turkey does not have a cap and trade system or issue approval letter, no authorization or approval is needed.

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Appendix 1: Contact information of project participants

Organization name	Derin Enerji Üretim Sanayi ve Ticaret Anonim Şirketi
Street/P.O. Box	Turan Güneş Bulvarı
Building	75/4
City	Ankara
State/Region	Cankaya
Postcode	06550
Country	Turkey
Telephone	+90 312 490 98 38
Fax	+90 312 490 48 40
E-mail	info@derinenerji.com
Website	http://www.derinenerji.com/
Contact person	
Title	Manager
Salutation	Mr
Last name	Dirsek
Middle name	-
First name	Murat
Department	Management
Mobile	-
Direct fax	+90 312 490 48 40
Direct tel.	+90 312 490 98 38
Personal e-mail	murat@derinenerji.com

Organization name	Global Tan Energy Limited
Street/P.O. Box	Ehlibeyt Mah 1259. Sokak
Building	7/2
City	Ankara
State/Region	-
Postcode	06520
Country	Turkey
Telephone	(0090) 312 472 35 00
Fax	(0090) 312 472 33 66
E-mail	gte@gtecarbon.com
Website	www.gtecarbon.com
Contact person	
Title	Managing Director
Salutation	Mr.
Last name	DEMİRKOL
Middle name	Kemal
First name	Mehmet
Department	Management
Mobile	-
Direct fax	(0090) 312 472 33 66
Direct tel.	(0090) 312 472 35 00
Personal e-mail	kemal@gtecarbon.com

Appendix 2: Affirmation regarding public funding

No Public funding is used for the project activity.

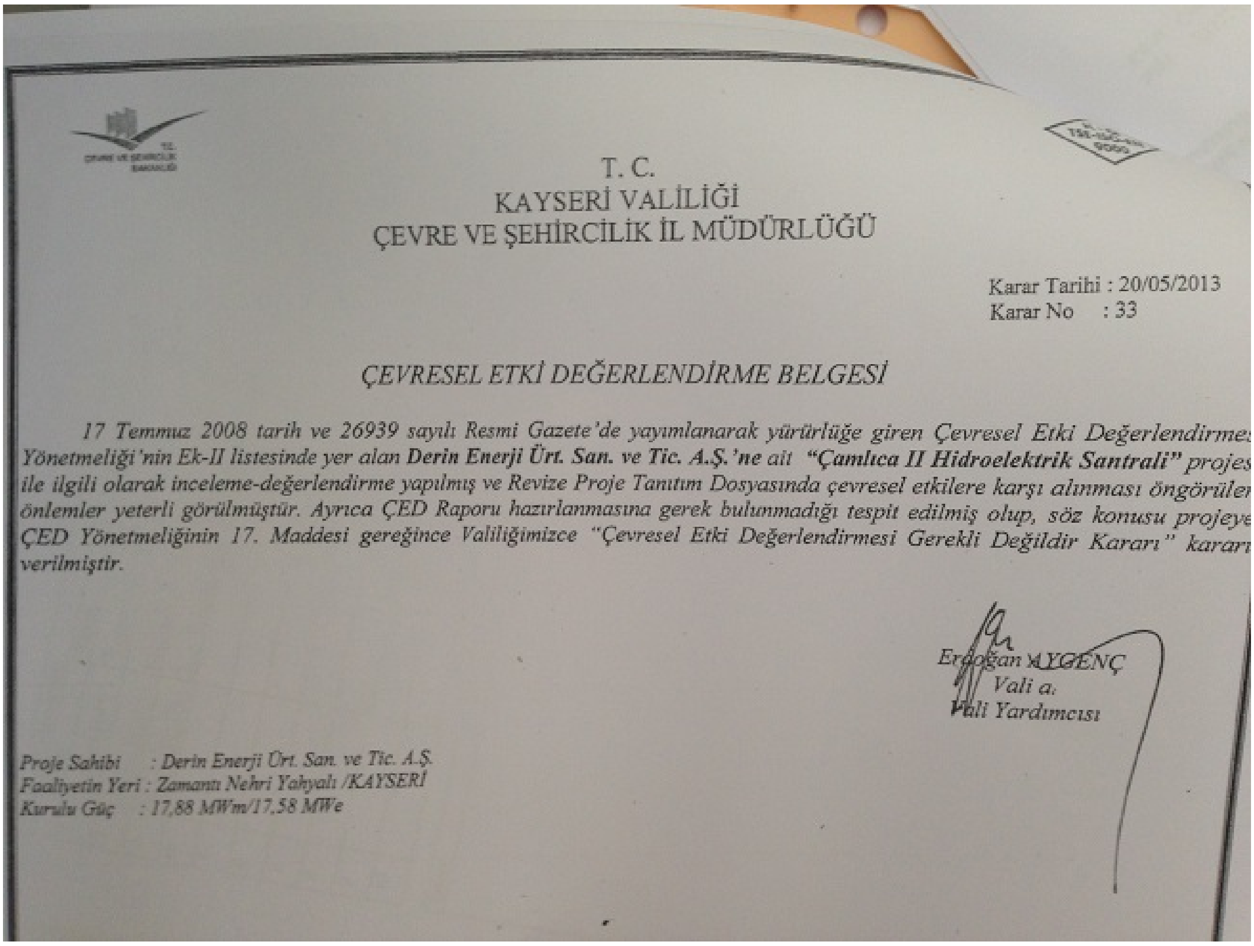
Appendix 3: Applicability of selected methodology

Relevant information is provided in section B.2

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

Relevant information is provided in section B.6.3

Appendix 5: Further background information on monitoring plan



T. C.
KAYSERİ VALİLİĞİ
ÇEVRE VE ŞEHİRCİLİK İL MÜDÜRLÜĞÜ

Karar Tarihi : 20/05/2013
Karar No : 33

ÇEVRESEL ETKİ DEĞERLENDİRME BELGESİ

17 Temmuz 2008 tarih ve 26939 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirme Yönetmeliği'nin Ek-II listesinde yer alan ***Derin Enerji Ürt. San. ve Tic. A.Ş.'ne*** *ait* ***"Çamlıca II Hidroelektrik Santrali"*** *projes ile ilgili olarak inceleme-değerlendirme yapılmış ve Revize Proje Tanıtım Dosyasında çevresel etkilere karşı alınması öngörüler 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" kararı verilmiştir.*

Erdoğan AYGENÇ
Vali a.
Vali Yardımcısı

Proje Sahibi : Derin Enerji Ürt. San. ve Tic. A.Ş.
Faaliyetin Yeri : Zamantı Nehri Yahyalı /KAYSERİ
Kurulu Güç : 17,88 MWm/17,58 MWe

Appendix 6: Summary of post registration changes

N/A

Appendix 7: List of Operational HEPPs

Below is a list of operational hydro power plants with similar capacity to the proposed project

Name of PowerPlant	**Capacity (MWe)**	**Fuel / Type**	**Company Type**	**Comment**
ÇAĞ-ÇAĞ(NAS EN.)	14.4	HYDRO	Transfer of Operational Rights	SCALE IS DIFFERENT
KOVADA-I(BATIÇİM EN.)	8.3	HYDRO	Transfer of Operational Rights	SCALE IS DIFFERENT
AKSU (ÇAYKÖY)	16.0	HYDRO	BOT	INVESTMENT MODEL
FETHİYE	16.5	HYDRO	BOT	INVESTMENT MODEL
GAZİLER (Iğdır)	11.2	HYDRO	BOT	INVESTMENT MODEL
GİRLEVİK-II / MERCAN	11.0	HYDRO	BOT	INVESTMENT MODEL
GÖNEN	10.6	HYDRO	BOT	INVESTMENT MODEL
TOHMA MEDİK (ALARKO)	12.5	HYDRO	BOT	INVESTMENT MODEL
ANADOLU ÇAKIRLAR	16.2	HYDRO	GENERATION COMPANY	GS Listed
ASA EN.(KALE REG.)	9.6	HYDRO	GENERATION COMPANY	GS-ISSUED
BALKONDU I HES (BTA ELEK.)	9.2	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
BEREKET (FESLEK)	9.5	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
BEREKET (GÖKYAR)	11.6	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
ALP ELEKTRİK (TINAZTEPE)	7.7	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
BEYTEK(ÇATALOLUK HES)	9.5	HYDRO	GENERATION COMPANY	GS ISSUED
CEVHER (ÖZCEVHER)	16.4	HYDRO	GENERATION COMPANY	GS VALIDATED
ÇALDERE ELEKTRİK DALAMAN MUĞLA	8.7	HYDRO	GENERATION COMPANY	http://mer.markit.com/br-reg/public/index.jsp?q=CALDERE&s=cp
ÇAMLIKAYA	8.5	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
ÇANAKÇI HES (CAN	9.3	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT

EN.)				
ÇEŞMEBAŞI (GİMAK)	8.2	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
DARCA HES (BÜKOR EL.)	8.9	HYDRO	GENERATION COMPANY	GS REGISTERED
ENERJİ-SA-AKSU-ŞAHMALLAR	14.0	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
ERVA KABACA HES	8.5	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
FİLYOS YALNIZCA HES	14.4	HYDRO	GENERATION COMPANY	GS VALIDATED
GÖK HES	10.0	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
GÜZELÇAY-I HES(İLK EN.)	8.1	HYDRO	GENERATION COMPANY	GS LISTED
H.G.M.ENER.(KEKLİCEK HES)	8.7	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
HİDRO KONTROL (SELİMOĞLU HES)	8.8	HYDRO	GENERATION COMPANY	GS ISSUED
İÇ-EN ELEK. ÇALKIŞLA	7.7	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
İÇTAŞ YUKARI MERCAN	14.2	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
KARASU 4-2 HES (İDEAL EN.)	10.4	HYDRO	GENERATION COMPANY	http://mer.markit.com/br-reg/public/project.jsp?project_id=103000000002001
KAR-EN KARADENİZ ELEK.(ARALIK HES)	12.4	HYDRO	GENERATION COMPANY	GS REGISTERED
KAYABÜKÜ HES (ELİTE ELEK.)	14.6	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
KAYEN ALFA EN.KALETEPE HES (tortum)	10.2	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
KAZANKAYA REG.İNCESU HES(AKSA)	15.0	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
KIRAN HES (ARSAN EN.)	9.7	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
KULP IV HES (YILDIZLAR EN.)	12.3	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
ÖZGÜR ELEKTR.K.Maraş Tahta HES	12.5	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
ÖZGÜR ELEKTR.AZMAK I	11.8	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT

ÖZTAY GÜNAYŞE	8.3	HYDRO	GENERATION COMPANY	GS ISSUED
PAŞA HES(ÖZGÜR EL.)	8.7	HYDRO	GENERATION COMPANY	GS VALIDATED
SARIKAVAK (ESER)	8.1	HYDRO	GENERATION COMPANY	GS LISTED
SAYAN (KAREL)	14.9	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
TEKTUĞ-KALEALTI HES	15.0	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
TEKTUĞ-ERKENEK	13.0	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
UMUT III HES(NİSAN EL.)	12.0	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
ÜZÜMLÜ HES (AKGÜN EN. ÜR. VE TİC. A.Ş.)	11.4	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
YAPRAK II HES (NİSAN EL. ENERJİ)	10.8	HYDRO	GENERATION COMPANY	SCALE IS DIFFERENT
REŞADİYE I HES(TURKON MNG EL.	15.7	HYDRO	GENERATION COMPANY	GS REGISTERED
REŞADİYE III HES(TURKON MNG EL.	22.3	HYDRO	GENERATION COMPANY	GS LISTED
SARMAŞIK I HES (FETAŞ FETHİYE ENERJİ)	21.0	HYDRO	GENERATION COMPANY	
SARMAŞIK II HES (FETAŞ FETHİYE ENERJİ)	21.6	HYDRO	GENERATION COMPANY	
YEDİGÖL REG. VE HES (YEDİGÖL HES)	21.9	HYDRO	GENERATION COMPANY	Developed by EIE. Privatized
YEŞİLBAŞ	14.0	HYDRO	GENERATION COMPANY	VCS ISSUED
YAVUZ HES (MASAT EN.)	22.5	HYDRO	GENERATION COMPANY	
BEYKÖY ZORLU	16.8	HYDRO	GENERATION COMPANY	Built By DSI. Privatized in 2008
KUZGUN ZORLU	20.9	HYDRO	GENERATION COMPANY	Built By DSI. Privatized in 2008
TERCAN ZORLU	15.0	HYDRO	GENERATION COMPANY	Built By DSI. Privatized in 2008
ÇILDIR ZORLU	15.4	HYDRO	GENERATION COMPANY	Built By DSI. Privatized in 2008
İKİZDERE ZORLU	18.6	HYDRO	GENERATION COMPANY	Built By DSI. Privatized in 2008
MERCAN ZORLU	20.4	HYDRO	GENERATION COMPANY	Built By DSI. Privatized in 2008

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History of the document

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