

TOROS HYDROELECTRIC POWER PLANT

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Project Title	Toros Hydroelectric Power Plant
Version	2.02
Date of Issue	20-04-2015
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PROJECT DETAILS

1.1 Summary Description of the Project

Bereket Enerji Üretim A.Ş. is to construct Toros Regulator and Hydro Power Plant (HPP) on the Çakıt Stream, within the jurisdiction of Pozantı Town of Adana Province. The purpose of the project is electricity production using the potential energy of Çakıt Stream as a renewable resource. Therefore, the electricity is going to be produced without causing airborne pollutants or Green House Gas (GHG) emissions. The construction and operation of the Toros regulator and HPP will be retarding the addition of conventional thermal power plants to the Turkish National Electricity Grid.

As shown on the EMRA approved electricity production license¹ the established capacity of Toros HPP is 49 MW. The project is expected to produce a total of 239,400.00 MWh² of electricity per year therefore the plant load factor of the project calculates to be, 55.77 %, as shown in the below calculation:

$$\frac{239,400 \text{ MWh}}{49 \text{ MW} \times 365 \times 24 \text{ h}} = \frac{239,400}{429,240} = 0.5577 = 55.77\%$$

Based on Turkey's Combined Margin Emission Factor of 0.53012 CO_{2e} tonnes /MWh, the project is expected to produce 126,911.5 tonnes of CO_{2e} GHG reductions each year.

The Environmental impacts of the project will be kept to a minimum and all the regulations that are in act in turkey will be obeyed during the construction and operation stages of the Toros HPP project. At the planning stage these impacts have been investigated and are presented to the Ministry of Environment and Forestry (MoEF). The report is examined by MoEF and it was decided that there is no need for an detailed Environmental Impact Assessment study for the Projects. Considering that the project will be using the water resource that is also essential for the aquatic life in the area, there will be a fish ladder (Fish passage way) at the downstream and upstream directions of the construction to facilitate fish migration. Since the project is designed as a run off river type power plant, the minimum water that is necessary for the sustainability of the aquatic life in the river will always be released.

The Major milestones at the project development history can be summarized as shown in the following table (Table 1):

¹ Toros HPP Electricity Production Licence Dated 18/01/2007 numbered EÜ/1062-2/782

² Based on Toros Feasibility Study Report pdf page 72 of the file Toros HES Fizibilite 3.pdf.

Table 1: Major Project Milestones

Date	Milestone	Reference
01/07/05	Toros Feasibility Study Report was issued	Toros FSR
23/03/06	DSI Approved the Feasibility study Report	DSI Correspondence
28/11/06	Water usage agreement (WUA) signed with DSI	WUA
18/01/07	Electricity Production License numbered EÜ/1062-2/782 was issued by EMRA	License
01/05/08	Construction Started	NHS Records
24/09/09	Project Loan Agreement was signed	Loan Agreement
25/09/09	Contract signed with the subcontractor for the construction of major structures	Inarma Contract
23/06/10	EIA Exemptions certification issued	Certificate
30/09/10	Amendment to the WUA signed	Amendment declaration later
07/12/10	Grid connection agreement signed	Agreement
12/01/11	DOE Contracted for Validation	Contract

The Toros HPP is going to be made up of one hydro power plant. There will be one regulating body that will be taking up the water from the 700 m elevation level and the tail water level will be 330.00 m. The potential energy of water at approximate gross head level of 370 m will be utilized and the energy will be produced by the Toros Hydroelectric Power Plant.

The water will be entering to the regulatory body and the water collecting area over the Çakıt Stream at the 700 m elevation level. Then the water will be settled at the sedimentation pool and will be transferred to a tunnel with a diameter of 3.5 m and a length of 11,860 m. The water that will pass this tunnel will then be transferred to a canal and be transferred to the loading pool via penstock, and will be passed to the hydro power plant building where the electricity will be produced. The water will then be left back to the Çakıt stream at the 330 m elevation level. See the following figure (Figure 1) that represent the schematic description of the project principles.

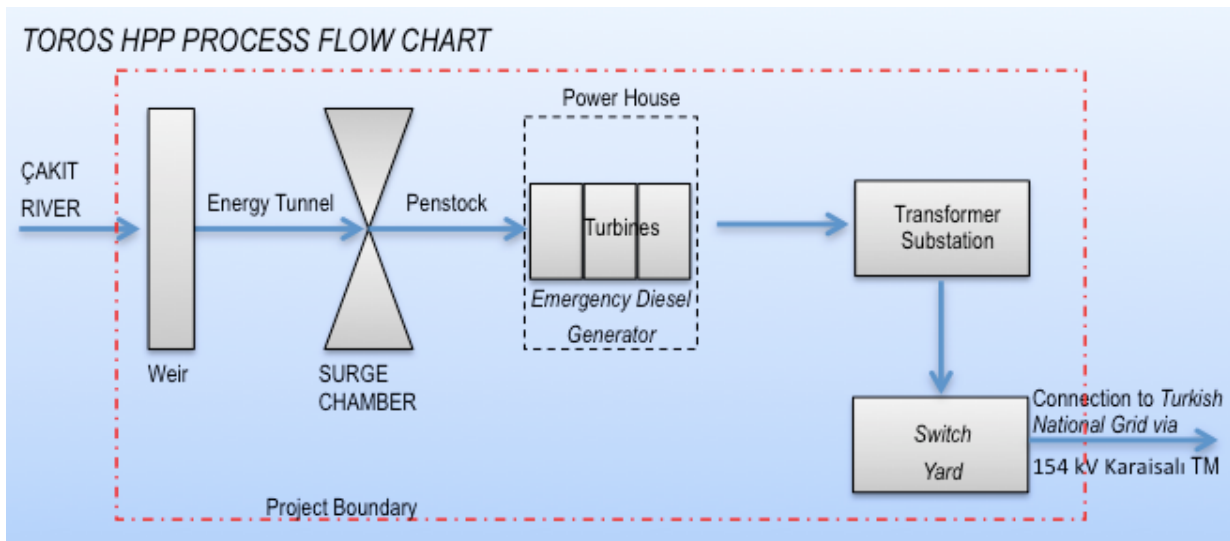


Figure 1: Flow chart showing the basic operational principles of the project activity. The project activity will be connected to the grid via the 154 kV Karaisalı Transmission Line, as indicated in the connection agreement provided to the validating DOE.

1.2 Sectoral Scope and Project Type

The project category is Sectoral Scope 1: Energy industries (renewable-/non –renewable sources). The project is a non-grouped, stand alone project.

1.3 Project Proponent

Provide contact information for the project proponent(s). Copy and paste the table as needed.

Organization name	Bereket Enerji Üretim Anonim Şirketi
Contact person	Özgün Gül Koparan
Title	Environmental Affairs Manager
Address	Gazi Mustafa Kemal Bulvarı 15 Mayıs Mah. 832 Sok. No:2 75.Yıl Esnaf Sarayı K:2 Denizli-Turkey
Telephone	+90 258 242 27 76
Email	ogul@bereketenerji.com.tr

1.4 Other Entities Involved in the Project

Organization name	Turkuaz Karbon Varlık Yönetimi Enerji Proje ve Dan. San. İth. İhr. Ltd. Şti.
Role in the project	Preparation of the Project Description Document
Contact person	Dr. Aslı Sezer Özçelik
Title	Carbon Consultant
Address	Güneykent Sitesi 1839. Sk. No.56 Ahlatlıbel Mah. Çankaya-Ankara-Turkey
Telephone	+903124891338
Email	asli.ozcelik@ekobil.com

1.5 Project Start Date

17 May 2013 is the date when the project started to supply electricity to the Turkish grid as substantiated by the partial acceptance letter sent to the Governance of Adana Province, Adana-Turkey.

1.6 Project Crediting Period

The project crediting period is 10 years: 17.05.2013 to 16.05.2023 (both days inclusive).Renewable twice.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	☒

Large project	
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Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 0: 17.05.2013 to 31.12.2013	79,740
Year 1: 2014	127,655
Year 2: 2015	127,655
Year 3: 2016	127,655
Year 4: 2017	127,655
Year 5: 2018	127,655
Year 6: 2019	127,655
Year 7: 2020	127,655
Year 8: 2021	127,655
Year 9: 2022	127,655
Year 10: 2023 (01.01.2023 to 16.05.2023)	47,915
Total estimated Ers	1,276,550
Total number of crediting years	10
Average annual Ers	127,655

1.8 Description of the Project Activity

Toros HPP, that will be built on Çakıt Stream will be approximately at the elevation of 700.00 m. The Toros HPP will be utilizing approximately 370 m of potential energy difference to produce electricity.

Construction phase of the project is expected to carry out approximately 24 months. The construction is expected to start in October 2009 and the project is expected to be commissioned in the first quarter of 2012.

Toros HPP that will have 49.00 MW installed capacity will be connecting to the Turkish National Power Grid via one of Transformer Substations by 15 km long 154 kV Karaisalı transmission line. As the project will be operational, a reliable, continuous, independent from imported fossil fuels, and an uninterrupted high quality power at 154 kV voltage level will be supplied to consumers in Turkey. Thus, launching the project will affect positively both Turkey's and region's economy.

The project will involve collecting of water, at the 700m level, by the help of a regulator and a water intake body. After that the water will be kept at the settling tanks and will pass to the

diversion tunnel that will be carrying the water for 11.86 km³. After the water will leave the diversion tunnel it will enter into the penstock and will be transferred to two turbines, each with 24.50 MWe capacity, via a surge Tank. The two turbines will be housed within the Hydro Electricity Power Plant Building. The water that will hit these two turbines, will then leave the turbines via the tail water canal and a spillway which is going to be located at a level of 330m.

The following are the facilities to be constructed:

- Toros Regulator to be constructed at approximately 700 m elevation level
- Water Intake Body and the Settling Tank
- Derivation Tunnel
- Penstock
- Surge Tank
- Hydro Electricity Power Plant Building
- Tail water canal and spillway
- The switch gear area and the transformer

General technical characteristics of Toros HPP is given below (Table 2):

Table 2 : General technical characteristics of Toros HPP (Based on data provided in the Project Feasibility Report Dated July,2005)

The Weir	
Place	The Weir will be located on the Çakıt Stream, at the close proximity of the Belemelik village, in Pozantı Town of Adana Province.
Purpose	According to water flow direction, diverting the Çakıt Stream water to water intake structure.
Flood flow rate of regulator	Q ₁₀ = 332.0 m ³ /s Q ₁₀₀ = 666.0 m ³ /s
Elevation of the river bed	696.00 m
Type	Free Flow Spillway and Concrete Body
Height from the foundation of the regulator	3,5 m (Approximately)
Height of the regulator from the River Bed	4.00 m
Normative maximum water level	702 m
Environmental maximum Elevation	700 m
Maximum Operation Elevation	700 m
Full Body Crest Length	197 m (including the middle feet)
Gravel Passage Place	Left bank
Gravel Passage Size	3.0 m x3.0 m
Conduit/Tunnel	
Place	(No diversion tunnel, conduit inside river) According to the flow in the right bank
Type	Horse shoe
Project Flow Rate(Flood) acc.	Min water in summer season

³ Based on data presented on Chapter 1 (pdf page 14 of the file Toros HES Fizibilite 1.pdf) of the FSR July 2005 prepared according to DSI rules and presented to the government authorities

Length	11,860.00 m
Water Intake Structure (Socket)	
Place	According to the flow direction at the left side, at the beginning of sedimentation basin
Type	Intake opening with a grid, cofferdam slot cover, operation gate (from the plant control)
Power Plant Building	
Gross fall	370 m
Net fall	354,68 m
Total Installed Capacity (Bar)	49 MW
Project Flow Rate	16 m³/s
Annual Energy Production:	
Firm Energy	53.31 GWh/year
Secondary Energy	186.09 GWh/year
Total Energy	239.40 GWh/year
Unit Number	2
Unit Flow Rate	8 m³/s
Net Fall	354,68 m
Unit Installed Capacity(generator output)	24.5MW
Plant and switchyard Equipment	
Project Flow Rate	16 m³/s
Installed Capacity	49.00 MWe (Generator output)
Unit Number	2 (Two) Pieces
Turbine Type	3 Phased synchronized generator
Rated Net Fall	354,68 m
Rated Flow Rate	16 m³/s
Generators	
Type	3 phase, AA, synchronous generator, vertical
Rated Power	32000 kVA (kW)
Voltage	10,5 kV
Unit Transformer	
Transformer Number	(1) pieces
Type	3 phase, two wings, oily, external type
Capacity	50/62 MVA
Strain Ratio	154 / 10,5 kV
Switchyard	
Type	12 kV, metal shielded, 40 kA,4000 A, internal switchyard cell
Type	170 kV, metal shielded, 31,5 kA, external type
Operating Voltage - Maximum Operating Voltage	154 kV – 10,5 kV
Emergency Diesel Generator	
Rated Capacity	1 (One) piece
Rated Capacity	100 kVA
Main Measurement to Energy Sales	Unit transformers on the YG side
Control Systems	Automatically and SCADA
Communication	Fibber optic cable and with PLC

1.9 Project Location

The project will be located in Adana province, along the Çakıt Stream (Figure 2).

The following are the coordinates of the major project structures (Table3):

Table 3: The Geographic coordinates of the major project structures:

Name of Structure	Latitude	Longitude
Toros Power House	37°16'50.82"N	34°59'59.35"E
Toros Weir Point 1	37°21'38.73"N	34°54'54.15"E
Toros Weir Point 2	37°21'40.01"N	34°54'59.19"E
Toros Surge Pond	37°16'54.80"N	34°59'12.33"E



Figure 2: The Google Earth Image showing the Project Location. (The related .kml file is provided to the validating DOE).

1.10 Conditions Prior to Project Initiation

The project is a renewable energy project, prior the project initiation, there was no other hydro electric power plant installation at the project site..

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

Addition of a new power generation capacity to the grid is regulated by Energy Market Regulatory Authority (EMRA) who issues the licenses for electricity generation and is responsible for ensuring that new capacity applies with its rules and regulations. The list of the rules and regulations of the host country that a new electricity generation project has to comply is given in Appendix 1.

1.12 Ownership and Other Programs

1.12.1 Right of Use

Ownership of the plant, equipment and electricity generation licence belongs to Bereket Enerji Üretim Anonim Şirketi and all emission reductions/removals are granted to the company. The production license and the operating certification of the company given by the Chamber of Commerce are provided to the validating DOE as proof of the Title.

1.12.2 Emissions Trading Programs and Other Binding Limits

Not applicable.

1.12.3 Other Forms of Environmental Credit

Not applicable

1.12.4 Participation under Other GHG Programs

Not applicable.

1.12.5 Projects Rejected by Other GHG Programs

Not applicable.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The project is not a grouped project activity.

Leakage Management

Not applicable, as per ACM0002 Version 16.0.0 page 18, paragraph 60.

“No leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected”

Commercially Sensitive Information

A detailed excel workbook summarizing the financial analysis is provided to the validating DOE with relevant evidences that are commercially sensitive.

Further Information

No further information to be added

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The following UNFCCC methodology and its related tools are utilised:

Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources." Version 16.0.0.

The Approved Methodology refers to the following tools:

"Tool for the demonstration and assessment of additionality" (Version 07.0.0)
 "Tool to calculate the emission factor for an electricity system". (Version 04.0)
 "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 02)
 "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 5.0.0).
 "Tool to determine the remaining lifetime of equipment" (EB 50 Report, Annex 15 version 0.1),

Only the following tools are utilized:

"Tool for the demonstration and assessment of additionality" (Version 07.0.0)
 "Tool to calculate the emission factor for an electricity system". (Version 04.0.0).
 "Tool to determine the remaining lifetime of equipment" (EB 50 Report, Annex 15 version 0.1),

2.2 Applicability of Methodology

The ACM0002 (version 16.0.0) 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 choice of methodology ACM0002, Version 16.0.0, is justified as the project activity meets the following applicability criteria:

Reference page in ACM0002 (version 16.0.0)	Applicability Criteria	Justification
4 paragraph 4	((a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	The Toros HPP project activity is the Installation of a new hydro power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant)
5 paragraph	In case of hydro power plants: One of the following conditions shall apply:	The project activity satisfies condition (c), as it results in a new reservoir and the power

	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 is increased and the power density calculated using equation (3), is greater than 4 W/m²; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m²; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m², all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m²; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	which is greater than 4 W/m² as shown in the following calculation: Installed Capacity/ Reservoir Area⁴=Power Density 49,000,000 W/42,878 m²= 1,142.78 W/m²
5 paragraphs 6 to 8	In the case of integrated hydro power projects, project proponent shall: Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	Not Applicable as the project activity is the addition of a new hydro power plant with only a single reservoir.
5-6 paragraph 9	The methodology is not applicable to: (e) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (f) Biomass fired power plants/units.	The Project activity is eligible as : It does not involve switching from fossil fuels It is not a biomass fired power plant Although it is the creation of a hydro power plant with a new reservoir it's power density is greater than 4 W/m² (the power density of the project activity is 1,142.78 W/m²).
6 paragraph 10	In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	Not Applicable as the project activity is the addition of a new hydro power plant thus a new reservoir, and it is not a retrofit, replacement or capacity addition project.
6 paragraph 11	In addition, the applicability conditions included in the tools referred to below apply⁵.	Not applicable as the tools referred does not have additional requirements is not used in the case of the project activity.

⁴ The reservoir Area is shown by a topographic map as shown in Appendix V

⁵ The condition in the "Combined tool to identify the baseline scenario and demonstrate additionality" that all potential alternative scenarios to the proposed project activity must be available options to project participants does not apply to this

2.3 Project Boundary

Table 4 exhibits the gases included in the project boundary. CO₂ emission is included in the baseline but the project activity does not emit any of the gases listed, in Table 4.

The project boundary includes net electricity generated and supplied to the Turkish national grid. The GHG emissions due to the temporary use and burning of the diesel fuel by the auxiliary power generator, is not included to be inline with the methodology.

Table 4: Main gases included in the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Electricity generation in baseline (Turkey's Grid)	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	N.A.	N.A.
Project	Emission from the reservoir of the proposed project	CO ₂	No	Minor emission source
		CH ₄	No	Minor emission source (Power density greater than 10W/m ²)
		N ₂ O	No	Minor emission source
		Other	N.A.	N.A.
	Auxiliary Diesel Generator	CO ₂	Yes	Neglected ⁶
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	N.A.	N.A.

2.4 Baseline Scenario

Since the proposed project activity is the installation of a new grid-connected hydroelectric, that is renewable power plant and therefore, the baseline scenario is defined as the following based on ACM0002 (Version 16.0.0), Section 5.2. page 10 paragraph 23:

“23. If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

Since the proposed project activity is going to be connected to the Turkish national grid, the baseline scenario of the proposed project is the supply of the equivalent amount of annual

⁶ ACM0002 Version 16.0.0 indicates that “ For all renewable energy power generation project activities, emissions due to the

power output by the existing Turkish national grid which is the continued operation of existing power plants and the addition of new sources to meet electricity demand.

Based on ACM002 (version 16.0.0), baseline emissions are equal to power generated by the project activity that is delivered to the Turkish national grid, multiplied by the baseline emissions factor. This baseline emissions factor (EF_y) is calculated as the Combined Margin (CM), of which the breakdown and detailed description is given below in chapter 3.

2.5 Additionality

The proposed project activity reduces GHG emissions by substituting fossil fuel based electricity generation by renewable resources (hydro) based electricity generation.

This part refers to the “Tool for the Demonstration and Assessment of Additionality Version 7.0.0” and the numbering in this section reflects the Tool’s Guidelines provided at EB 39.

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

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

The tool notifies that “Project activities that apply this tool in context of approved consolidated methodology ACM0002 (version 16.0.0), only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity.”

The project alternative can be defined as follows:

“Continuation of the current situation (No project activity or other alternatives undertaken). This alternative is the most likely scenario, since there are no legal obligation to implement such a project and without VCS support the project implementation is financially not attractive. “

Outcome of Step 1a: The only realistic and credible alternative scenario to the project activity is Continuation of the current situation, without any project undertaken .

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

The project alternative, the baseline scenario which is the continuation of the existing situation is in compliance with all mandatory applicable and legal and regulatory requirements. Also the alternative scenario of addition of a new power generation capacity to the grid is regulated by Energy Market Regulatory Authority (EMRA) who issues the licenses for electricity generation and is responsible for ensuring that new capacity applies with its rules and regulations. The list of the rules and regulations of the host country that a new electricity generation project has to comply with, is given in Appendix I.

Outcome of Step 1b: The alternative scenario to the project activity is the supply of electricity by the existing grid with additional capacity is in compliance with mandatory legislation and regulations.

Step 2 - Investment analysis

At this step it will be demonstrated that “the proposed project activity is not the most economically and financially viable” option without the VER revenue.

Sub-step 2a - Determine appropriate analysis method

There are three options for investment analysis method:

- Simple Cost Analysis

- Investment Comparison Analysis and
- Benchmark Analysis

“Simple Cost Analysis” is not applicable for this project activity as the project generates economical benefits from sale of electricity to the Turkish national grid”. Investment Comparison Analysis is also eliminated since the baseline for the project is “the generation of electricity by the existing grid” and no similar investment alternatives exist. Therefore, Benchmark Analysis is the most appropriate approach for the evaluation of the project activity.

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

Internal Rate of Return (IRR) on equity is taken for this project to be the financial indicator for assessing the financial viability of the project activity..

Equity IRR is the cash flow return to equity shareholders after debt repayments. And therefore also takes into account the debt repayments. Equity IRR takes into consideration that you use debt for the project, so the inflows are the cash flows required minus any debt that was raised for the project. The outflows are cash flows from the project minus any interest and debt repayments.

To be able to assess the financial viability of the project a benchmark to compare the equity IRR is needed.

The Tool for the Demonstration and Assessment of Additionality Version 6 and the Guidelines issued at EB 62¹⁹ state that “...Discount rates and benchmarks shall be derived from: Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data”

The Guidelines issued at EB 62⁷, provides the default values for the expected return on equity as an appendix, and Moody’s index values of most of the CDM Countries. Turkey’s Moody’s index at the time⁸ of investment decision,⁹ (Ba3) is comparable to country’s with the same Moody’s index such as Bangladesh, Montenegro, Philippines, Uruguay and Viet Nam, from this point of view a reasonable and appropriate benchmark to compare the Equity IRR can be taken as 12.75 %.

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

The following parameters are taken into account for the assessment of the investment (Table 5) and supplementary parameters are provided in the “TorosFinancialAnalysis” workbook and submitted to the validating DOE.

Table 5: Major parameters¹⁰ taken into account for the financial analysis and determination of the Equity IRR of the Toros HPP Project:

Parameter	Value	Unit	References
Installed Capacity	49.00	MW	Electricity Production License
Expected Annual Electricity Generation	239,400	MWh	Toros Electricity Production Licence Dated 18/01/2007 numbered EÜ/1062-2/782 page 7

⁷ EB 62 Report Annex 5 Guidelines on The Assessment of Investment Analysis (Version 05)

⁸ The investment decision date is marked as the construction start date (May 2008), e.i. when the project owner decided to start up with the construction. Because the project owner have communicated with the finance institutions and were sure to receive a loan for the project. So they decided to move forward with the project. To be conservative we have utilised the parameters and values of the realized loan agreement, because this was the best offer for the project owner. Please also note that the Moody’s Index for Turkey was same for the years 2008 and 2009 (when the loan agreement was signed).

⁹ <http://countryeconomy.com/ratings/turkey>

Expected Annual Emission Reduction(ER)	127,655	tCO ₂ e	Calculated (see Chapter 3 for details)
Expected VCS-SCS-VCU sales price	4.00	USD/t CO ₂ e	Estimation
Total Investment	65,887,378	USD	Based on assumptions presented on table 9.1 (pdf page 74 of the file Toros HES Fizibilite 3.pdf) of the FSR July 2005) prepared according to DSI rules and presented to the government authorities
Annual Operation Costs	1,008,955.09	USD	Based on assumptions presented on table 9.1 (pdf page 74 of the file Toros HES Fizibilite 3.pdf) of the Toros FSR July 2005) prepared according to DSI rules and presented to the government authorities (Staff cost is estimated based on number of 9 employees to be recruited permanently as indicated in the Pre-EIA document.
Loan	Confidential	USD	Loan Agreement
Loan Period	12	years	Loan Agreement
Electricity Sales Price	0.06	USD/KWh	Based on pdf page 74 of the file Toros HES Fizibilite 3.pdf of the Toros FSR July 2005- Price considered for firm energy is taken for the entire production.
VAT	18	%	V.A.T. Law No:3065
Income Tax	20	%	Income Tax Law number 5281

The value of the investment has been depreciated on a reducing balance basis over 20 years. And 70 % of the long lasting assets are depreciated over 45 years and the residual book value of 25,072,487.42 USD is added back to the cash flow. The economic life time of a hydro power plant investment is assumed to be about 50 years. The “Tool to determine the remaining lifetime of equipment” (EB 50 Report, Annex 15 version 0.1), suggests 150,000 hours of technical lifetime for a hydro turbine. Dividing the default technical lifetime hours with the annual expected work hours of the project activity:

150,000h/3180 h= 47 years.

Yet, based on the experts’ committee report¹¹, under the 8th development plan published by the State planning organization, even if the facility can last for 50 years the major equipment needs to be replaced in every 20 years¹². The technical lifetime of the project activity is longer than the crediting period (10 years, renewable twice), therefore as the investment analysis guideline (version 5, EB 62 Report, Annex 5) suggests “Both project IRR and equity IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or – if a shorter period is chosen- include the fair value of the project activity assets at the end of the assessment period.” We have taken into account this fair book value of the project, and as suggested by the investment analysis guideline: “ In general a minimum period of 10 years and a maximum of 20 years will be appropriate.” Therefore, the financial analysis of the project activity is done for a time frame of 20 years, after the commissioning of the project activity.

¹¹ <http://ekutup.dgt.gov.tr/enerji/ik/E95.pdf> (See page 4, 25 (on p72 of pdf) Last visited on 06/02/2012)

This is the reason why a residual and fair book value of 25,072,487.42 USD is added back to the cash flow, considering that this is the amount of the asset at the end of the 20 years time frame that we considered for IRR calculation.

For the assessment of the viability of the project activity the Equity IRR is calculated with a post tax approach and compared to the benchmark. The equity IRR is worked out as 10.30 % which is below the benchmark of 12.75%.

Sub-step 2d - Sensitivity Analysis

To be able to conclude if the investment decision is the financially the most attractive alternative, a sensitivity analysis is performed. Three parameters that effect the equity IRR are examined for the sensitivity analysis:

- Investment Cost
- Operating and Maintenance Cost
- Electricity Revenue

The sensitivity analysis is performed for a range of $\pm 10\%$ fluctuations in the above parameters. The figures in the following table (Table 6) are obtained. Following the "Guidelines on the assessment of investment analysis (Version 05)" of EB 62 Annex 5 when any of the key variables are increased or decreased by at least 10%, and the benchmark is not exceeded (also see Figure 3).

Table 6: Sensitivity analysis for the Equity IRR without carbon revenue for the project (Benchmark: 12.75%)

Change	-10%	-5%	5%	10%	Exceed Benchmark?
Investment Cost	12.70%	11.36%	9.42%	8.68%	No
Operating Cost	10.42%	10.36%	10.23%	10.17%	No
Electricity Revenue	8.59%	9.45%	11.13%	11.95%	No

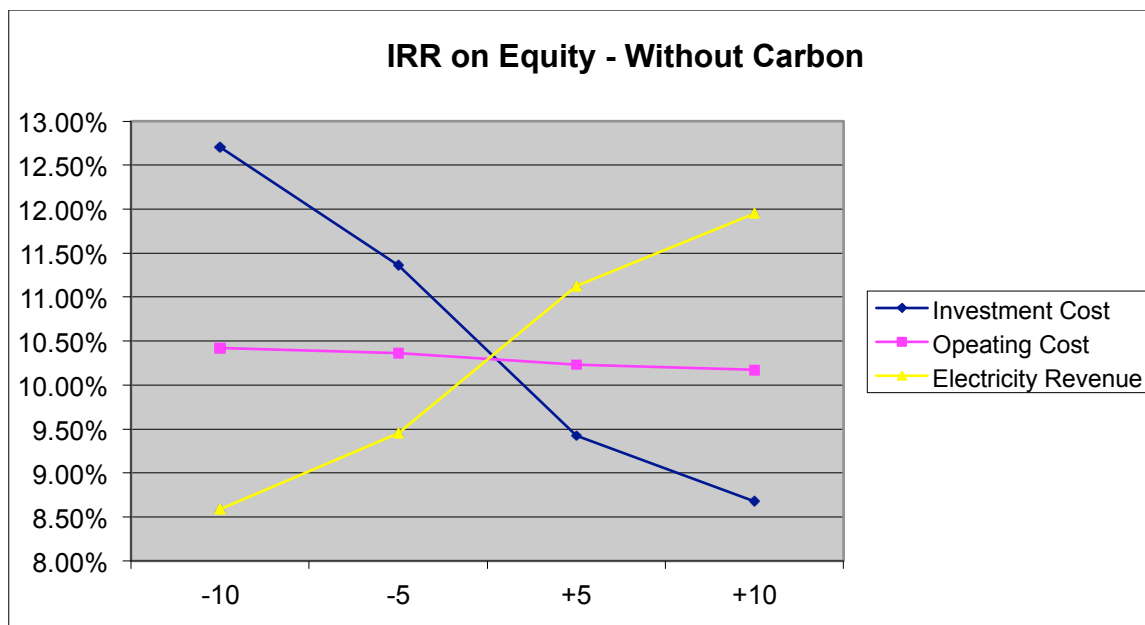


Figure 3: Sensitivity analysis: Fluctuation of the Equity IRR without the carbon revenue, by changing major parameters that effect the Equity IRR by ±10%

To exceed the benchmark, the electricity revenue must increase by about 15.00% over the life of the project, or the investment cost must be reduced by about 10.15%. Considering the fact that the global financial crisis can also effect the host country there is a great possibility that the demand for electricity may decrease and the prices may not increase to reach the benchmark, over the course of the project activity. On top of that the average electricity sales price is realized as about 4 to 4.13 cents per kWh this is also below the estimated electricity sales prices. As the feasibility report considers the firm and secondary energy to be produced based on the historical river flow data, and is the maximum amount of electricity that can be produced by the project activity. As a result it is highly unlikely that the production could increase by 15%. Also when we check the realized electricity production data we observe that the project could only produce 131,5 MWh in 2014, and this is also about 40 % below the amounts estimated in our financial analysis. In addition to this the available water flow data does not consider the globally accepted facts related to climate change that is expected to cause droughts during the life span of the project activity. The climate change models indicate for the Mediterranean basin an increased drought and water scarcity that could even risk the project to reach the estimated production values. A 10.15% decrease of the investment cost is also very unlikely. The investment costs we have considered in our financial analysis is reasonable and considering the long tunnel structure that the project needs to dig through the Toros Mountain range, and in general in hydroelectricity projects that highly depend on unpredictable geographical and geological issues only realized at the time of construction action, one can expect an increase in the investment cost but a decrease is very unlikely. As such, during the course of the validation process the project activity became operational and based on the accounts records of the project owner, the

investment cost has finalized as approximately 77,000,000 USD. This is already about 18 % higher than the amounts estimated at the time of investment decision.

Outcome of Step 2:

Without the VER revenue the Internal Rate of Return of the project can not get close to the benchmark of 12.75 %, with an equity internal rate of return of 10.30%. A fluctuation of $\pm 10\%$ in the key parameters also does not make the project exceed the benchmark.

Step 3 - Barrier Analysis

As the investment analysis concludes that the proposed project activity is unlikely to be the most financially attractive option, the sub step 3- Barrier analysis is optional to be applied and barrier analysis is not considered for the project activity.

Step 4: Common Practice Analysis

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

As per “Tool for the Demonstration and Assessment of Additionality”, 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 frame-work, investment climate, access to technology, access to financing, etc. According to the Guidelines on Common Practice (EB69 Report;Annex8-version 02), common practice analysis is presented through the following 5 steps.

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

As a hydropower project, the installed capacity is chosen as an appropriate proxy for “similar scale”. The power generation capacity of 49.00 MW of the proposed project is selected as the design capacity. Therefore, the range from 24.50 to 73.50 MW is considered as applicable capacity.

Common Practice tool Step 2: identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

- (a) The projects are located in the applicable geographical area;
- (b) The projects apply the same measure as the proposed project activity;
- (c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
- (d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
- (e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
- (f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

The project activity is located within the borders of the 18th water catchment that is designated as the Seyhan Catchment (See Figure 4). The investment conditions and the water regimes are similar in this area that this is considered to be the applicable geographic area. The range the range from 24.50 to 73.50 MW, the hydroelectric power plant projects that are within this range, operational within the borders of the Seyhan Catchment are given below in Table 7:



Figure 4: The map showing the catchment boundaries within Turkey. The project is located within the borders of the number 18 Seyhan Catchment.

Table 7: The list of all the hydroelectric power plants that are within the capacity range. (Source: A list of units providing electricity to the year 2011 Turkish Electricity Grid is provided as an Annex 1 to the most recent Capacity Projection report published by TEIAS

(<http://212.175.131.171/projeksiyon/KAPASITEPROJEKSİYONU2012.pdf>)¹⁴

Name of HPP	Capacity	Production n GWh	Firm Production n GWh	Province	Catchment	DSİ District
Mentaş (Bereket En.)	39.9	163	140	Adana	18 Seyhan	06 Adana
Feke 2 (Akkur En.)	69.3	223	126	Adana	18 Seyhan	06 Adana
Menge (Enerji-Sa)	44.7	102	58	Adana	18 Seyhan	06 Adana
Saraçbendi (Çamlıca)	25.5	101	57	Kayseri	18 Seyhan	12 Kayseri
Seyhan I (EÜAŞ)	60	350	212	Adana	18 Seyhan	06 Adana

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all} .

Looking at the above table (Table 7) Feke 2 (Akkur En.) HPP (VCS 534), Menge (Enerji-Sa) HPP (VCS 578), and Saraçbendi (Çamlıca) HPP (VCS 758) are observed to be registered VER project activities. Therefore excluding them we get the following 2 projects listed in Table 8, as the projects that will be considered within N_{all} .

¹³ We have checked and identified the ones that have claimed VERs by comparing the list to the Gold Standard registry (<https://gs2.apx.com/myModule/rpt/myrpt.asp?r=111>) and VCS Project Database (<http://www.vcsprojectdatabase.org>). This list is provided to the validating DOE.

¹⁴ We have checked and identified the ones that have claimed VERs by comparing the list to the Gold Standard registry (<https://gs2.apx.com/myModule/rpt/myrpt.asp?r=111>) and VCS Project Database (<http://www.vcsprojectdatabase.org>). This list

Table 8: Projects that are commissioned before the project activity that can be considered to be included in the count of N_{all} .

Name of HPP	Capacity	Production GWh	Firm Production GWh	Province	Basin	DSI District	Ownership
Mentaş (Bereket En.)	39.9	163	140	Adana	18 Seyhan	06 Adana	Private
Seyhan I (EÜAŞ)	60	350	212	Adana	18 Seyhan	06 Adana	Government

As explained above, considering the 18th Seyhan Catchment and checking all the power plants within the capacity range determined in Step 2, and looking projects that have started commercial operation before the start date of the project, it is revealed that there are only 2 power plants operational in the Turkish grid with a capacity ranging between 24.50 to 73.50 MW (See Table:8). Therefore the number of N_{all} is 2.

Common Practice tool Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff} .

Common Practice tool Sub-step 4a:

When we consider the project listed in Table 8, these projects are different from the project activity, Toros HPP in the following aspects:

- Seyhan HPP was developed very early in history by the government and has totally different investment conditions. Seyhan is a not a run off river project but is rather a Dam that became operational in 1958.
- Mentaş project was developed on the main stream of the basin namely Seyhan River, and thus the flow regime can be considered different . And by the time it was developed there was no opportunity to apply for a CDM or VER Mechanism. The project became operational in 2006. About 6 years prior to the project activity.

However, with a conservative approach we can consider this projects to be similar to the project activity and we take $N_{diff}=1$.

Conclusion of Common Practice tool Sub- Step 4b is $N_{diff}=1$

Common Practice tool Step 5: 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.

$$\begin{aligned}
 F &= 1 - N_{diff}/N_{all} \\
 F &= 1 - (1/2) \\
 F &= 1 - 0.5 \\
 F &= 0.5
 \end{aligned}$$

Common Practice tool Step 5: Conclusion

The proposed project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3

Factor F is calculated to be $0.5 > 0.2$, however

$N_{all}-N_{diff}=2-1=1 < 3$ in that case the Toros HPP is not common practice.

Conclusion of Step 4: In conclusion the proposed project activity is deemed to be additional according to ACM0002 (ver.16.0.0) and the tool and guideline for the demonstration and assessment of additionality.

1. The Toros HPP project faces significant investment barriers. As shown by the benchmark analysis it is not the financially most viable option. Furthermore, the financial analysis may prove to be optimistic over time due to the negative effects of climate change.
2. The Toros HPP project is not common practice.

Carbon finance is essential to bring the project activity closer to the benchmark values and is essential for the implementation of the project activity by supplying a further stream of revenue, over and above the electricity revenue, to cover the difficulties that the project will face at investment and operation phases. The carbon revenue reduces the risk to the project investor by providing increased revenue to pay back the increased amount of equity required to fund the project costs.

2.6 Methodology Deviations

The UNFCCC methodology of ACM0002 (version 16.0.0) and its related tools are applied as they are without any deviation from methodology

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

According to the latest version (version 16.0.0) of ACM0002 and the tool to calculate the emission factor for electricity system, since the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”. (Version 4.0.0)

The Project therefore applies the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system” (version 4.0.0 - EB75, Annex 15) as follows:

Step 1 -Identify the relevant electricity systems

As the host country is not participating in the compliance markets hence does not have a DNA, a delineation of the project electricity system and connected electricity systems has not been published yet. For such cases, the tool suggests using the following criteria 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.” This criteria is not applicable as there is no spot electricity market in the host country.

“The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year”: The transmission line operator (TEIAS) or any other official source has not published the capacity usage figures for the Turkish grid, hence this criterion can not be proved.

According to the tool, where the application of these criteria does not result in a clear grid boundary, a regional grid definition in the case of large countries with layered dispatch systems (e.g. provincial / regional / national) shall be used. A provincial grid definition may indeed in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity. In other countries, the national (or other largest) grid definition should be used by default.

Therefore, for the case of the subject project activity “the project electricity system” and “the connected system” are same, and the Turkish National Grid is used as the “project electricity system”. It is also confirmed by TEIAS that the Turkish grid is interconnected. There isn’t any independent or regional grid system in any region of Turkey. The map of the Turkish Electricity Grid is given in the below figure (Figure 6):

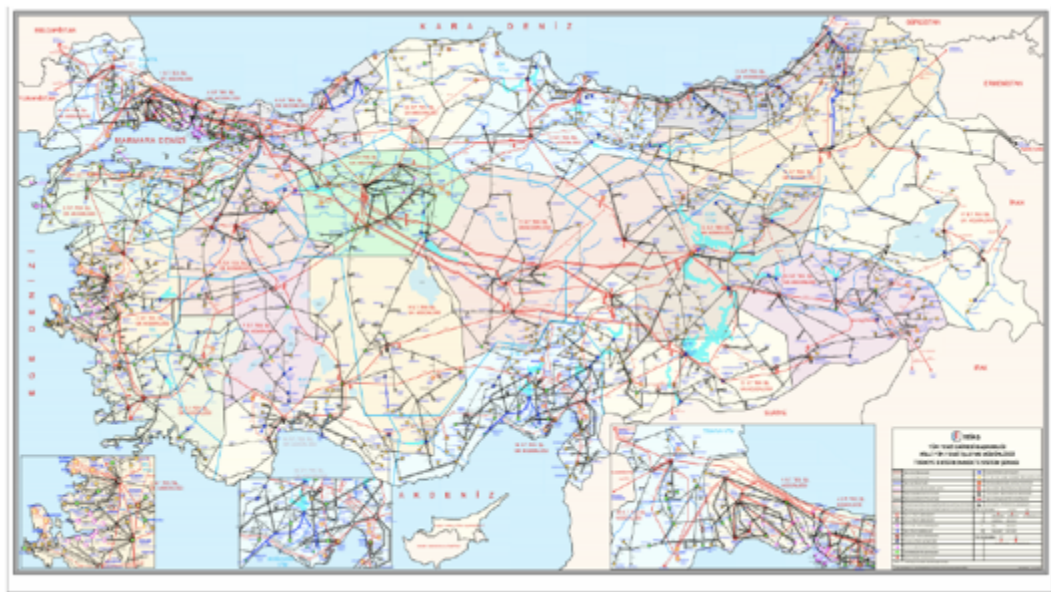


Figure 5: The Map showing the boundaries of Turkish Electricity Grid (Source Electricity Market Report 2010, by Electricity Market Regulatory Authority
<http://www.epdk.gov.tr/documents/10157/48dd12d4-74da-4dcf-9f48-86983146c0d8>)

All the calculations details of which are given below are made for the entire Turkish Grid.

For the purpose of determining the operating margin emission factor, the tool directs us to use one of the following options to determine the CO₂ emission factor(s) for net electricity imports from a connected electricity system:

0 tCO₂/MWh; or (a) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 (d) below; or (b) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 (a), if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or (c) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 (b) below.

For imports from connected electricity systems located in Annex I country(ies), the emission factor is 0 tons CO₂ per MWh.

And the tool also notes that the ... "Electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the electricity emission factors."

In our case the host country (imports electricity mainly from Annex -1 countries, so the emission factor related to imports is considered to be zero"0"

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

The tool requires Project participants to choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

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

In our case, “Option I” has been selected for the calculation of grid emission factor, and only grid power plants are included in the calculation.

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

According to the “Tool to calculate the emission factor for an electricity system”, version 3.0.0 in calculating the Operating Margin grid emission factor for a given year y (EF_{grid,OM, y}), project developers have the option of selecting from four methods:

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

As the share of “low cost/must run” resources are below 50% for the five most recent years (Table 9), therefore, in accordance with the Tool, (a) Simple OM method will be used in the calculations.

Table 9: Share of primary sources in electricity generation, 2007 – 2011¹⁵

	2007	2008	2009	2010	2011
Thermal	81.02 %	82.72 %	80.5 %	73.78 %	74.82%
Hydro	18.72 %	16.77 %	18.46 %	24.52 %	22.81%
Wind & Geothermal	0.26 %	0.51 %	0.99 %	1.70 %	2.36%
Total	100 %	100 %	100 %	100 %	100 %

Since the Simple OM calculation (option (A)) is selected, the emission factor is calculated by the generation-weighted average emissions per electricity unit (tCO₂/GWh), and averaged over the past three years of all generating sources serving the system, not including low-cost / must run power plants. The tool gives two options for the calculation of 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 emission factor be updated annually during monitoring.

For the calculation of the Simple OM, the “Ex-Ante” option is selected, at the time of PDD submission to the DOE, the data vintages that were most recent at the start of validation, belongs to the years 2009, 2010 and 2011. All the data used in calculation of the Simple OM are taken from the TEIAS website, details of which are given below.

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

¹⁵ Annual Development of Installed Capacity Generation in Turkey (1970-2011)
http://www.teias.gov.tr/TurkiyeElektrikIstatistikleriIstatistik2011/kaynaklar/12_24/12_24a

The Simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit of net electricity generation (tCO₂/MWh) for all generating power plants serving the system, not including low-cost / must run plants / units. It may be calculated:

- Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit; or
- Option B: 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.

The following data are available from the Turkish Electricity Transmission Company (TEİAŞ) web site:

- Annual fuel consumption by fuel type¹⁶,
- Annual heating values for fuels consumed for electricity generation¹⁷,
- Annual electricity generation by fuel type, import and export¹⁸

Taking into consideration the available data Simple OM method Option B is the applicable method for the project activity. Option A requires data on net electricity generation of each power plant / unit and a CO₂ emission factor of each power unit, both of which are not publicly available, for the Turkish electricity grid.

EF_{grid,OMsimple,y}, using option B 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 the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y})}{EG_{y,grid}} \quad (7)$$

Where:

EF_{grid,OM simple,y} = Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)

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

NCV_{i,y} = Net calorific value (energy content) of fossil fuel type *i* in year y (GJ/mass or volume unit)

EF_{CO₂,i,y} = CO₂ emission factor of fossil fuel type *i* in year y (tCO₂/GJ)

EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y (MWh)

i = All fossil fuel types combusted in power sources in the project electricity system in year y

y = The relevant year as per the data vintage chosen in Step 3

¹⁶ Fuel Consumed in thermal P.P.in Turkey by the Electric Utilities (2007-2011)

(<http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/47.xls>)

¹⁷ Heating Values Of Fuels Consumed In Thermal P.Ps In Turkey By The Electric Utilities (2007-2011),

(<http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/49.xls>).

¹⁸ Turkey's Gross Electricity Generation by Primary Energy Resources and The Electric Utilities (2007-2011) /

(http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/gerretim9/20tutuktim99_45/46/46_44.xls) / Annual Development of Electricity Generation

Step 5 - Calculate the build margin (BM) emission factor:

The tool indicates that, in terms of vintage of data, project participants can choose between one of the following two options:

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.

And ,

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 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.

We prefer the Option 1, calculating the Build Margin Emission factor, “*ex ante*”, for the first crediting period.

The sample group of power units *m* used to calculate the build margin are 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 ($SET_{5-units}$) and determine their annual electricity generation ($AEG_{SET-5-units}$, in MWh);
- b) Determine the annual electricity generation of the project electricity system; excluding power units registered as CDM project activities (AEG_{total} , in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET-\geq 20\%}$, in MWh);
- c) From $SET_{5-units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}); Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin.

According to the tool in terms of vintage of data, project participants can choose either the *ex-ante* option or the *ex-post* option. Between these two options, Option 1 is selected. For the first crediting period, the build margin emission factor is calculated *ex-ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor will 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 will be used. This option does not require monitoring the emission factor during the crediting period.

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

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 electricity generation data is available

According to the tool, the CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in step 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin. Taking into consideration the available data on the capacity additions, the formula given under Option A2 of the Simple OM option A is used to calculate $EF_{EL,m,y}$. For this calculation the generation efficiencies are taken from Annex 1 of the Tool.

The CO₂ emissions from the most recent capacity additions are calculated by multiplying the $EF_{EL,m,y}$ values calculated for each fuel source by the annual generation of that fuel source (see Table 15). The emission factor has been taken as “zero” for the renewable and wastes and the generation efficiencies for the thermal power plants type of which are not known are taken as 60%, which is generation efficiency for the combined cycle natural gas power plants. The Build Margin Emission Factor for each year is calculated by dividing the total CO₂ Emissions of the subject year by the total generation from the capacity additions of the same year.

The Build Margin Emission Factor of the grid is then calculated as an average for the years 2008, 2009 and 2010, as explained in the part where the actual calculations are shown, the assessed capacities added in these two years constitutes our SET_{sample}.

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

Finally, the combined margin grid emission factor ($EF_{grid,CM,y}$) is expressed as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$):

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Where:

$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EF_{grid,OM,y}$	Operating margin CO ₂ emission factor in year y (tCO ₂ /MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)

Where weights w_{OM} and w_{BM} are by default 0.50 and 0.50 according to the selected methodology. And $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ are calculated as described in the previous steps.

Then baseline emissions (BE_y) are obtained as:

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

Where:

- BE_y = Baseline emissions in year y (tCO₂/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 CO₂ emissions factor in year y (tCO₂/MWh)

And

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

- $EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant to the grid in year y (MWh/yr)

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

$$ER_y = BE_y - PE_y - L_y$$

Where:

- ER_y = Emission reductions in year y (tCO₂)
- BE_y = Baseline emissions in year y (tCO₂)
- PE_y = Project Emissions in year y (tCO₂)
- L_y = Leakage emissions in year y (tCO₂)

As methodology states the L_y in case of a hydro power project to be zero hence $ER_y = BE_y - PE_y$

3.2 Project Emissions

As methodology states the PE_y in case of a hydro power project will be calculated:

“Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

For hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH₄ and CO₂ emissions from the reservoir, estimated as follows:”

“...the power density of the project activity (PD) is greater than 4 W/m² and less than or equal to 10 W/m².”

As shown by the following calculation, The project has a power density of 17,367.52 W/m², this is greater than 10 W/m²,

Project Activity	Installed Capacity	/	Reservoir Area ¹⁹	=	Power Density
Toros HPP	49,000,000 W	/	42,878 m ²	=	1,142.78 W/m ²

therefore

$$PE_{HP,y} = 0$$

Where:

- $PE_{HP,y}$ = Project emissions from water reservoirs (tCO₂e/yr)

There may be one diesel generator installed within the project boundary. This is only going to be utilized as a back-up or emergency generator, therefore, the emissions from this back up generator

have been deemed negligible as per the ACM0002 (version 16.0.0) methodology.

3.3 Leakage

There are no leakage emissions related to project activity.

3.4 Net GHG Emission Reductions and Removals

Ex-ante calculation of emission reductions:

Simple Operating margin (OM)

As also explained above, for the computation of the Simple OM, the Ex-Ante option is selected, at the time of PDD submission to the DOE, the data vintages that were most recent, belongs to the years 2009, 2010 and 2011. All the data used in calculation of the Simple OM are taken from the TEİAŞ website, details of which are given below. Taking into account the available data “Simple OM” method “Option B” is the appropriate method for the project activity. TEİAŞ publishes the annual heating values of the fuels consumed in the power plants, the heating values are directly related to fuel consumption and are used to calculate average Net Calorific Values (TJ/kt) (Table 10).

The heating values of fuels consumed in thermal power plants are announced by TEİAŞ, the unit of the heating values are Tcal. Tcal is converted to GJoule by using the conversion factor 1cal = 4.1868 Joule. Then the heating values in GJ are divided by Fuel Consumption ($FC_{i,y}$) to get the Net Calorific Values of the fuels consumed in TJ/kton as follows:

Table 10: Net Calorific Values for each fuel type for Turkey

Fuel Type	NCV (TJ/KT)		
	2009	2010	2011
Hard Coal+ Imported Coal	22.21	22.32	22.79
Lignite	6.43	7.13	7.30
Fuel Oil	39.81	40.23	41.58
Diesel Oil	42.37	33.09	43.15
LPG	46.47	0.00 ¹³	0
Naphtha	43.65	33.50	0
Natural Gas	43.65	33.50	37.10

The emission factors of fuels required are taken from IPCC 2006 guidelines for GHG inventories²⁰. All data used for the calculations can be found in Appendix-2. (See Table 1 and Table 2 to in Appendix-2). Table 11 shows total CO₂ emission by fuel types calculated using lower IPCC emission factors and available data from the TEİAŞ website.

²⁰ Table 2.2.Default Emission Factors for Stationary Combustion in the Energy Industries, Vol.2. Energy, 2006 IPCC Guidelines for National Greenhouse Gas Inventories. (<http://www.ipcc.org>)

Table 11: Calculation of emission by electricity generation (2009-2011)

	Default CO ₂ Emissions (tCO ₂)		
	2009	2010	2011
Hard Coal+Imported Coal	13,649,138.82	15,365,199.79	22,366,901.55
Lignite	37,164,240.90	36,745,389.26	40,801,815.79
Fuel Oil	4,792,096.57	2,708,730.18	52,086,506.72
Diesel Oil	556,318.57	63,674.50	1,604,878.16
Lpg	317.74	0.00	39,996.20
Naphta	24,429.94	30,502.68	0.00
Natural Gas	42,346,272.06	44,215,362.69	0.00
TOTAL	98,532,496.86	99,128,859.11	110,822,747.76

Net electricity generated and supplied to the grid by thermal power plants has been calculated using data obtained from TEİAŞ web page. The ratio between total gross and total net generation (including low-cost/must run plants) has been calculated for each year. The same ratio is assumed to be valid for all thermal plants and total net generation by the plants has been calculated accordingly. Summing up total net generation with the imported electricity, total supply excluding low cost / must run sources for each year is determined and given in Table 12.

Table 12: Net Electricity Generation from thermal power plants (units in GWh)

	2009	2010	2011
Unit:	GWh		
Net Generation	186,619.30	203,046.10	217,557.70
Gross Generation	194,812.90	211,207.70	229,395.10
Net/Gross Ratio	0.9579412	0.9613575	0.9483973
Net Thermal Generation	150,323.43	149,806.03	162,781.31
Electricity Imports	812.00	734.26	4,555.80
EGy (GWh)	151,135.43	150,949.83	167,337.11
EGy (MWh)	151,135,428.72	150,949,827.21	167,337,105.18

The OM Emission Factor for the years 2009, 2010 and 2011 are calculated by dividing the total CO₂ emissions for those years (Table11) to the Net Electricity Generation (Table 12) for the subject year. The annual OM emission factors are calculated as follows (Table 13):

Table 13: Annual OM Emission Factors

Year	OM Emission Factor
2009	0.65195
2010	0.65670
2011	0.66227

Finally, OM emission factor is calculated as a generation weighted average for the three most recent years. The resulting OM Emission Factor is;

$$EF_{\text{grid,OMsimple}} = 0.65716$$

Build margin

As mentioned above we have preferred the Option 1, calculating the Build Margin Emission factor, “ex ante”, for the first crediting period.

The sample group of power units m used to calculate the build margin are 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 ($SET_{5-units}$) and determine their annual electricity generation ($AEG_{SET-5-units}$, in MWh);
- b) Determine the annual electricity generation of the project electricity system; excluding power units registered as CDM project activities (AEG_{total} , in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET-\geq 20\%}$, in MWh);
- c) From $SET_{5-units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}); Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin.

Since TEİAŞ didn't announce the commissioning dates of the power plants added to the grid in 2011, it is not possible to identify the amount of electricity produced by the newly added 5 units or the $SET_{5-units}$.

The net electricity generation in year 2011 is taken as reference for determination of plants that comprise 20% of the system generation. Based on Turkey's Annual Electricity statistics published on the TEİAŞ web site (www.teias.gov.tr), the net generation in year 2011 was 217,557.7GWh (See Table 12, in 2011, out of this amount 9,646.71 GWh was identified²¹ to be produced by projects that claimed VERs, excluding this number from the net generation we end up with 207,910.99 GWh of electricity which is our AEG_{TOTAL} and 20% of that amount is calculated as 41,582.198 GWh.

As we are unable to determine the $AEG_{SET-5-units}$ and the entire added capacity in year 2011 was 15,454.53 GWh, a number which is less than 20% of AEG_{TOTAL} , it is therefore obvious that 20% of AEG_{TOTAL} , is higher than $AEG_{SET-5-units}$.

Therefore the 20% of AEG_{TOTAL} with a value of 41,582.198 GWh is to be compared to the capacity additions in the recent years, and used as AEG_{SAMPLE} to calculate Build Margin Emission Factor.

Summing up the electricity generations of all the plants added to the Turkish National Grid in 2010 and 2011, but excluding the projects that claimed VERs, the total generation in this two years sums up to 41,710.56 GWh.

²¹ A list of units providing electricity to the year 2011 Turkish Electricity Grid is provided as an Annex 1 to the most recent Capacity Projection report published by TEİAŞ (<http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf>). We have checked and identified the units that have claimed VERs by comparing the list to the Gold Standard registry (<http://gs2.org.com/modules/content/view/full/111>) and VCS Project Database (<http://www.vcsprojectdatabase.org>). This list

The total generation by the power plants added in year 2011 is 15,454.53 GWh. This number is still smaller than the $AEG_{SET\ 20\%}$ value of 41,582,198 GWh. Therefore, to reach the $AEG_{SE\ 20\%}$ all the units added in year 2010 are also added. As a result, the $AEG_{SET\ Sample}$ value we are using in our BM calculation is 47,710.56 GWh and is greater than the 20% of the total generation. So only the power plants added in the last 2 years, excluding those claiming VER credits, are used in the calculations. As there is no power unit older than 10 years this number is being used for Build Margin Calculations.

The lists of most recent capacity additions to the grid by year and their average and firm generation capacities for the years 2011, and 2010 are available as Annex-2 to the capacity projection reports published in the TEİAŞ web page. Although the annual generation capacity data for each plant is not available on the statistics page of TEİAŞ. The data for the years 2011²² and 2010²³ are taken from the TEİAŞ Capacity Projection Reports which are also available in another section of the TEİAŞ website. For the capacity additions, the firm generation capacities of the power plants are used. The units that are taken out of the grid are not taken into consideration. All the data used for calculations can be found in Annex-2 (see Table 8a and Table 8b).

According to the tool in terms of vintage of data, a project participant can choose either the ex-ante option or the ex-post option. As explained above, out of these two options, as mentioned above, Option 1 is selected. For the first crediting period, the build margin emission factor is calculated ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor will 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 will be used. This option does not require monitoring the emission factor during the crediting period.

Electric efficiency rates

There is no complete and up-to-date data regarding the electrical efficiency of thermal power plants that supply electricity to the Turkish National Grid system. Therefore the default values provided in Annex 1 (Default efficiency factors for power plants) of the Methodological Tool to calculate the emission factor for an electricity system (Version 3.0.0) (EB 70, Annex 22) is utilised, in a very conservative manner, considering that we are unable to differentiate the units that were commissioned before year 2000, and we cannot differentiate their technologies, all the coal and lignite fired thermal power plants are considered to operate with 50% efficiency, all the oil fired power plants are considered to operate with 46% efficiency, and all the Natural Gas fired power plants are considered to operate at 60 % efficiency. For the diesel powered thermal power plants the efficiency is considered to be 45%. Since the default values are not provided for Naphtha, it is considered to behave like oil and its efficiency is considered as 46%, and Bitumen is considered to behave like coal and its efficiency is considered to be 50%. The efficiency values considered in BM calculations can be summarized as follows (Table 14):

²² TEİAŞ Capacity Projection Report 20010-2019
(<http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf>)

Table 14: Default Electric efficiency rates taken from Annex 1 of the Methodological Tool to calculate the emission factor for an electricity system (Version 4.0.0) (EB 75, Annex 15).

Fuel Type	Average Electric efficiency rate
Coal	50.0%
Lignite	50.0%
Fuel Oil	46.0%
Diesel	46.0%
Naphtha	46.0%
Natural Gas	60.0%
Bitumen	50.0%

The calculation of $EF_{EL,m,y}$ is shown in Table 15 below:

Table 15: Calculation of EF_{EL} using default generation efficiencies based on the default values provided in Annex 1 of the Methodological Tool to calculate the emission factor for an electricity system (Version 04.0.0) (EB 75 Report Annex 15)

Fuel Type	EF (tCO ₂ /TJ)	(EF*3.6)	Generation Efficiency %	$EF_{EL,m,y}$ tCO ₂ /MWh
Coal	92.80	334.080	50.0%	0.668
Lignite	90.90	327.240	50.0%	0.654
Fuel Oil	75.50	271.800	46.0%	0.591
Diesel	72.60	261.360	46.0%	0.568
Naphtha	69.30	249.480	46.0%	0.542
Natural Gas	54.30	195.480	60.0%	0.326
Bitumen	73.00	262.800	50.0%	0.526

The CO₂ emissions from the most recent capacity additions are calculated by multiplying the $EF_{EL,m,y}$ values calculated for each fuel source by the annual generation of that fuel source (Table 16). The emission factor has been taken as “zero” for the renewable and wastes and the generation efficiencies for the thermal power plants type of which are not known are taken as 60% which is generation efficiency for the combined cycle natural gas power plants. The Build Margin Emission Factor for each year is calculated by dividing the total CO₂ Emissions of the subject year by the total generation from the capacity additions of the same year.

Table 16 Annual CO₂ Emissions for Capacity Additions and Annual BM Emission Factors

Capacity Additions in 2010 (GWh)		CO ₂ Emissions	$EF_{grid,BM,2010}$
Coal	12017.6	8,029.71	
Lignite	180.0	117.81	
Natural Gas	13108.5	4,270.76	
Renewables and Wastes	949.9	0.00	
TOTAL	26,256.04	12,418.28	0.47297
Capacity Additions in 2011 (GWh)		CO ₂ Emissions	$EF_{grid,BM,2011}$
Fuel Oil	922.67	545.18	
Coal	4.32	2.89	
Lignite	180.78	98.05	

Naphtha	-	0.00	
Natural Gas	12,301.75	4,007.91	
Renewables and Wastes	2,045.00	0.00	
TOTAL	15,454.53	4,654.02	0.30114

The Build Margin Emission Factor of the grid is then calculated as a generation weighted average for the years 2010 and 2011. The resulting BM Grid is:

$$EF_{\text{grid,BM}} = 0.40930 \text{ tCO}_2\text{e/MWh}$$

Combined margin emission factor

Where weights w_{OM} and w_{BM} are by default 0.50 and 0.50 according to the selected methodology. And EF_{OM} and EF_{BM} are calculated as described in the previous steps.

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

$$EF_y = 0.50 * 0.65716 + 0.50 * 0.40930 = 0.53323 \text{ tCO}_2\text{e/MWh}$$

$$\begin{aligned} ER_y = BE_y &= EG_{\text{facility,y}} * EF_y \\ &= 239,400 \text{ MWh} * 0.53523 \text{ tCO}_2\text{e/MWh} = 127,655 \text{ tCO}_2\text{e} \end{aligned}$$

A summary of the GHG removals by the project activity is given below, as follows:

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
2013 (17 May- 31 Dec.)	79,740	0	0	79,740
2014	127,655	0	0	127,655
2015	127,655	0	0	127,655
2016	127,655	0	0	127,655
2017	127,655	0	0	127,655
2018	127,655	0	0	127,655
2019	127,655	0	0	127,655
2020	127,655	0	0	127,655
2021	127,655	0	0	127,655
2022	127,655	0	0	127,655
2023 (1 Jan - 16 May)	47,915	0	0	47,915
Total	1,276,550	0	0	1,276,550

4 MONITORING

4.1 Data and Parameters Available at Validation

The following are the data and parameters available at validation:

Data Unit / Parameter	$FC_{i,y}$
Data unit	Mass or Volume Unit (Tonnes or cubic meter)
Description	Amount of fuel i consumed by relevant power plants in Turkey in years, 2009, 2010, 2011
Source of data	Turkish Electricity Transmission Company (TEİAŞ) Web Site (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/47.xls)
Value applied	Please see Appendix 2 (Table 1)
Justification of choice of data or description of measurement methods and procedures applied	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.
Purpose of Data	Data used for the calculation of $EF_{grid,OM,Simple,y}$
Comments	-

Data Unit / Parameter	NCV
Data unit	GJ/Mass or Volume Unit
Description	Net Calorific Values for fossil fuels in years 2009, 2010 and 2011
Source of data	Turkish Electricity Transmission Company Web Site (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/49.xls http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/47.xls)
Value applied	Please see Appendix-2 –Table 5
Justification of choice of data or description of measurement methods and procedures applied	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.
Purpose of Data	Data used for the calculation of $EF_{grid,OM,Simple,y}$. As data on the NCV is not published directly on the TEİAŞ website, this data is calculated using the heating values of fuels and the volume or mass of fuels consumed for each year.
Comments	-

Data Unit / Parameter	$EF_{CO_2,i,y}$
Data unit	tCO ₂ /GJ
Description	CO ₂ emission factor of fossil fuel type <i>i</i> in year <i>y</i>
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value applied	Please see Appendix 2-Table 2
Justification of choice of data or description of measurement methods and procedures applied	According to the "Tool to calculate the emission factor for an electricity system" version 2, if values provided by the fuel supplier of the power plants in invoices or regional or national average defaults values are not available the IPCC default values at the lower limit of uncertainty must be used.
Purpose of Data	Data used both for the calculation of $EF_{grid,OM,Simple,y}$ and $EF_{EL,m,y}$
Comments	-

Data Unit / Parameter	EG_y
Data unit	MWh
Description	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 <i>y</i>
Source of data	Turkish Electricity Transmission Company Web Site http://www.teias.gov.tr/TurkiyeElektrikIstatistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls
Value applied	Please see Appendix 2, Table 3 and Table 4
Justification of choice of data or description of measurement methods and procedures applied	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to-date and reliable data available for the Turkish grid.
Purpose of Data	Data used for the calculation of $EF_{grid,OM,Simple,y}$
Comments	-

Data Unit / Parameter	$EG_{m,y}$
Data unit	MWh
Description	Net quantity of electricity generated and delivered to the grid by power unit <i>m</i> in year <i>y</i>
Source of data	Turkish Electricity Transmission Company Web Site (www.teias.gov.tr). Data is extracted from the relevant annexes of the capacity projection reports for the years 2011 ²⁴ and 2012 ²⁵ .
Value applied	Please see Appendix 2-Table 8
Justification of choice of data or description of measurement methods and procedures applied	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to-date and reliable data available for the Turkish grid.
Purpose of Data	Data used for the calculation of $EF_{grid,BM,y}$
Comments	-

²⁴ <http://www.teias.gov.tr/teias/teias/KARASITERBOLIKSIVONULI2011.pdf>

Data Unit / Parameter	$\eta_{m,y}$
Data unit	-
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	The default values provided at the annex 1 of the “Tool to calculate emission factor for an electricity sector (version 4.0.0)” are used
Value applied	Please see Appendix 2
Justification of choice of data or description of measurement methods and procedures applied	According to the “tool to calculate emission factor for an electricity system if documented manufacturer’s specifications or data from the utility, the dispatch centre or official records are not available then the default values given in annex 1 of the tool shall be used. The first two options are not available for the power plants supplying the Turkish grid, therefore the default values are used.
Purpose of Data	Data used for the calculation of $EF_{grid,BM,y}$
Comments	-

4.2 Data and Parameters Monitored

The following are the data and parameters monitored subsequent to validation:

Data Unit / Parameter	EG _v
Data unit	MWh
Description	Electricity
Source of data	Net Amount of Electricity supplied to the “Turkish National Grid” by the proposed project
Description of measurement methods and procedures to be applied	Data will be measured directly from the electric meter and remotely recorded on TEIAS (grid owner) computerized systems.
Frequency of monitoring/recording	Annually
Value applied	Will be determined at the monitoring stage
Monitoring equipment	Data will be monitored continuously by redundant metering devices. The recording meter will be in compliance with the communiqué for Metering Devices to be used in the Electricity Market ²⁶ .
QA/QC procedures to be applied	There will be two meters that will backup each other. Generated electricity will also be monitored via the operator by the help of PMUM trading software for internal monitoring.
Purpose of data	Data to be used for the calculation of Baseline Emissions.
Calculation method:	Direct Continuous Measurement
Comments	The collected data will be kept by Bereket Enerji Üretim Anonim Şirketi During the crediting period and until two years after the last issuance of VERs for the “Toros Hydroelectricity Power Plant” project activity for that crediting period.

Data / Parameter:	CapPJ
Data unit:	W
Description:	Installed capacity of the hydropower plants after the implementation of the Project Activity.
Measured /Calculated /Default:	Measured
Source of data:	Project site computers with SCADA system and the turbine name plates.
Description of measurement methods and procedures to be applied:	Observed via the SCADA system of the Project Activity
Frequency of monitoring/recording:	Once for each monitoring period
Value applied:	49,000,000
Monitoring equipment:	SCADA system of the Project Activity
QA/QC procedures to be applied:	Can be confirmed also by the parameter readings on the design plates of each turbine and by summing the two units.
Calculation method:	N/A
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

²⁶ The latest version of the communiqué (in Turkish) can be found in the following link: <http://www.egm.gov.tr/turk/elektrik>

	Activity, when the reservoir is at its maximum fullness.
Measured /Calculated /Default:	Indirectly measured based on the reservoir area map provided in Appendix V.
Source of data:	Surface area determined using the lake surface area map provided in Appendix-V of this PD.
Description of measurement methods and procedures to be applied:	The reservoir area corresponding to maximum operational level has been determined via the topographic map showing the lake area, presented in Appendix-V.
Frequency of monitoring/recording:	Once during each monitoring period
Value applied:	42,878 m ²
Monitoring equipment:	-
QA/QC procedures to be applied:	Can be checked and compared to satellite imagery available by Google Earth.
Calculation method:	N/A
Any comment:	-

4.3 Monitoring Plan

Objectives of the monitoring program

The Monitoring plan is developed to ensure that the Project Activity is well organized from the start in terms of the collection and archiving of complete and reliable data that is needed to ensure reliable and accurate measurements of actual emission reductions.

Data to be monitored

Given that the emission factor is calculated on an ex-ante basis, the first data to be monitored is the net electricity supplied to the grid.

The second data to be monitored is the installed capacity of the Project Activity. Using the SCADA system installed capacity will be measured automatically.

The third data to be monitored is the reservoir area of the Project Activity. The reservoir area corresponding to maximum operational level has been determined as a certain value according to the topographical maps. In order to make verification of the reservoir area, the reservoir lake can be visited during the verification site visit and be compared to the reservoir area map, presented in Appendix V.

The electricity produced will be sold to TEİAŞ. Therefore, TEİAŞ measures the electricity produced by one meter placed on the switchgear station where the power plant gets connected to the Turkish national grid. This meter will provide official data which will be remotely read and recorded by TEİAŞ systems for invoicing. TEİAŞ also conducts the calibration and maintenance of these meters and thus, ensures the accuracy and quality of the measurements. The quality standards that the meters need to comply is "The ICE/TSE 62053-22: Electricity metering equipment (a.c) – Particular requirements - Part 22: Static meters for active energy (Classes 0,2 S and 0,5 S)" The calibration of the meters is done and the meters will be checked continuously if there is a difference of 0.2 % in the readings of the main and the auxiliary meters, the calibration is repeated.

The net electricity produced is calculated by subtracting the total electricity consumed by the hydroelectric power plant, from the gross electricity generation. After obtaining the net electricity production value, the emission reductions will be calculated by multiplying the net electricity with the Combined Margin calculated above.

The monitoring will be conducted by the Verified Emission Reduction (VER) Monitoring Team. The VER Team Members, and their position and duties for the monitoring is outlined in the following table (Table 17):

Table 17: Positions and responsibilities of the VER monitoring team members.

Position	Responsibility
Toros HPP Manager	Day to day operation of the Toros HPP, Compliance of the project activity with the host country rules and regulations Coordination of the data collection and recording for the VCS monitoring report.
Chief Electrical Engineer	Day to day follow up of electrical equipment Recording and monitoring of the electricity generation data
Accounts Manager	Data keeping for power sales Data entry to PMUM system
Chief Mechanical Engineer	Day to day operation of the power plant Keeping records of malfunctions and repairs
Carbon Consultant	Emission reduction calculations Scripting of the periodic monitoring report Follow up of the verification process

The power generation meter readings will be performed by using the main metering device and the auxiliary metering device for accuracy checks only. Data from metering devices will be recorded by TEİAŞ remote reading computerized systems, that can be retrieved on a monthly basis. This will form the basis for invoicing. In addition to the readings of the main metering device, generation data of the Toros HPP can be cross checked, via the TEİAŞ – PMUM web site (<http://pmum.teias.gov.tr>) which is accessible by a password available to the electricity generation companies. The electricity generation data at the Market Financial Reconciliation Centre (MFRC/PMUM) web page will exhibit the net electricity generated less transmission loss, to be able to produce comparable numbers, the figures taken from PMUM web site needs to be multiplied by the transmission loss factor of the grid.

5 ENVIRONMENTAL IMPACT

According to the rules and regulations at the time of licence application for electricity production the project was given a certificate of Exemption for the EIA process, by the Adana Provincial Directorate of Environment and Forestry. Because, at the time of licence application the Hydro Power Plants that had installed capacity lower than 50 MW was considered to be out of scope according to EIA regulation that was active during the period of application. This letter is attached in Appendix III.

Although there was no significant environmental impacts determined, the following is the summary of the impacts and the mitigation actions outlined in the Project Presentation Report submitted to the authorities:

Air Quality: Necessary precautions, such as watering roads, careful loading and unloading and covering the top of loaded trucks by tarpaulin; will be taken in order to minimize the dust formed during excavation.

Water & Wastewater Management: Water for domestic use will be supplied by tankers to the site and wastewater will be collected in septic tanks which will be emptied regularly. The wastewater will be discharged in accordance with Water Pollution Control Regulations.

The waste oil: Any kind of waste oil that may result during construction or operation stages, will be collected in impermeable containers and transferred to recycling centres in accordance with Hazardous Waste Control Regulations and Waste Oil Control Regulations.

Solid Waste: Solid waste will be collected and recyclables will be separated to be sent to recycling centres. The rest will be disposed to the nearest landfill site in coordination with Pozantı Municipality.

Biodiversity: The region is defined to include some of species under conservation by international conventions. Necessary precautions will be taken if any seen on the site. Also a fish passage will be constructed to ease up and down stream movements of the fish living in Çakıt river.

6 STAKEHOLDER COMMENTS

According to the rules and regulations at the time of licence application for electricity production the project was given a certificate of Exemption for the EIA process, by the Adana Provincial Directorate of Environment and Forestry. Because, at the time of licence application the Hydro Power Plants that had installed capacity lower than 50 MW was considered to be out of scope according to EIA regulation that was active during the period of application. And since no EIA process was followed, there was no stakeholders consultation meeting held for the project activity.

However, in order to comply with the rules and regulations of the host country (also listed in Appendix I), the project owner officially corresponded with all the relevant authorities that can as well be considered as stakeholders.

The project owner sent letters with the project information attached to government institutions such as Adana Provincial Directorate of Environment and Forestry, Adana Special Provincial Authority, to EMRA, to municipality etc. A list of these correspondences, indicating the dates, and the titles of the corresponding parties and the topic of the correspondences can be listed as follows (See table 18):

Table 18: A list of the correspondences of the project owner with its immediate stakeholders (All the letters listed on the first column are presented to the validating DOE).

Document File Reference	Date	Correspondents	Topic
A)201012130553.pdf	09/01/09	From Adana Special Provincial Authority to Bereket Enerji	Answer to resource needs based quarry land acquisition request
A)201012130553.pdf	26/04/10	From Bereket Enerji to Adana Provincial Directorate of Environment and Forestry	Information about environmental impact related issues and changes made as a result of feedback given by the corresponded department
A)201012130553.pdf	23/06/10	From Adana Provincial Directorate of Environment and Forestry to Bereket Enerji	Announcement of the EIA not needed decision and certification
A)201012130553.pdf	22/06/10	Pozantı Municipality and Bereket Enerji	The signed protocol to define handling of solid and liquid domestic waste and fees of

A)201012130553.pdf	05/10/09	From EMRA to Vakıflar Bankası (Loan Provider)	Informing the bank that they can proceed with the disposition of the electricity income of the project and that EMRA approval is not needed.
B)20101213055059.pdf	22/09/08	From Bereket Enerji to DSI	Protection of fuel pipelines nearby Project Activity
B)20101213055059.pdf	03/09/08	From DSI to Bereket Enerji	Warning about the protection of fuel pipelines
B)20101213055059.pdf	10/03/08	From Ministry of Energy and Natural Resources to Ministry of Environment and Forestry	about protection of fuel pipelines
C)20101213054709790.pdf	01/12/08	From Bereket Enerji to EMRA	Progress Report
D)20101213054721599.pdf	01/09/08	From Bereket Enerji to EMRA	Progress Report
E)20101213054732052.pdf	05/09/08	From Bereket Enerji to EMRA	Progress Report
F)20101213054741093.pdf	01/01/08	From Bereket Enerji to EMRA	Progress Report
G)20101213054754043.pdf	01/05/09	From Bereket Enerji to EMRA	Progress Report
H)20101213054814515.pdf	27/01/09	From Bereket Enerji to EMRA	Progress Report
H)20101213054814515.pdf	29/01/10	From Bereket Enerji to EMRA	Progress Report
H)20101213054814515.pdf	27/05/10	From Bereket Enerji to EMRA	Progress Report
H)20101213054814515.pdf	27/09/10	From Bereket Enerji to EMRA	Progress Report
I)20101213054910885.pdf	18/10/10	From Bereket Enerji to TEIAS	Agreement on Connection to Grid
I)20101213054910885.pdf	01/11/10	From TEIAS to Bereket Enerji	Affirmative response about the connection agreement request
J)20101213054929630.pdf	22/06/10	Bereket Enerji to DSI	Revision Request at the Water Usage Agreement (WUA)
J)20101213054929630.pdf	14/10/10	DSI to Bereket Enerji	Acceptance of the revision on WUA
K)20101213054937071.pdf	26/04/10	From Adana Forestry Department to Bereket Enerji	conditional approval and forestry permits
K)20101213054937071.pdf	19/04/10	From Bereket Enerji to Adana Forestry Department	Information about project peculiarities and request for necessary permits due to renewed project parameters
L)20101213054946359.pdf	16/04/10	From Bereket Enerji to EMRA	Request to extend the deadline for the completion of the project
L)20101213054946359.pdf	30/04/10	From EMRA to Bereket Enerji	Answer and conditions related to time exemption request
M)20101213055132817.pdf	13/02/10	From Bereket Enerji to EMRA	Letter presenting the EIA not needed certification
M)20101213055132817.pdf	23/02/10	From Bereket Enerji to Treasury	Letter requesting exemption from VAT tax, for the EM&HM equipment that will be imported
M)20101213055132817.pdf	04/10/10	From Bereket Enerji to EMRA	Requesting the start up process for the expropriation of treasury lands
M)20101213055132817.pdf	02/06/10	From Bereket Enerji to Adana Provincial Directorate of Environment and Forestry	Project Information Folder related to cement making facility

Please also note that at the close proximity of the project activity there are not much settlements and there were only two privately owned land parcels that the owners were contacted on an ad hoc basis about the project activity. Yet, the relations with public are monitored within the framework of the Social Carbon Standard Report.

APPENDIX I: THE LEGAL FRAMEWORK OF THE HOST COUNTRY THAT BINDS THE PROJECT

Turkish Environmental Legislation

The Environmental Law (No. 2872), which was published in Turkish Official Gazette No. 18132 dated August 11, 1983 and revised in Turkish Official Gazette No. 26167 dated May 13, 2006 (Law No. 5491) provides the legislative framework for the regulation of industries and their potential impact on the environment. Industrial projects are subject to varying levels of review that begin while projects are in the development and pre-operation phases. Additional regulations apply to facilities once they are in operation.

The Environmental Law authorized the promulgation of a number of regulations. Those that pertain to development and operation of renewable energy projects are the following:

- Environmental Impact Assessment Regulation, Official Gazette No. 26939 dated July 17, 2008.
- Water Pollution Control Regulation, Official Gazette No. 25687 dated December 31, 2004 and revised in Official Gazette No. 26786 dated February 13, 2008;
- Regulation on Construction of Cesspits where there is no Wastewater Collection System, Official Gazette No. 13783 dated March 13, 1971;
- Hazardous Chemicals Regulation, Official Gazette No. 21634 dated July 11, 1993 and revised in Official Gazette No. 27092 dated December 26, 2008;
- Regulation on General Principles of Waste Management, Official Gazette No. 26927 dated July 5, 2008;
- Hazardous Wastes Control Regulation, Official Gazette No. 25755 dated March 14, 2005;
- Waste Oil Control Regulation, Official Gazette No. 26952 dated July 30, 2008 and revised Official Gazette No. 27304 dated July 31, 2009;
- Vegetative Waste Oil Control Regulation, Official Gazette No. 25791 dated April 19, 2005; and revised Official Gazette No. 27305 dated July 31, 2009
- Solid Waste Control Regulation, Official Gazette No. 20814 dated March 14, 1991 and revised in Official Gazette No. 25777 dated April 5, 2005;
- Medical Waste Control Regulation, Official Gazette No. 25883 dated July 22, 2005;
- Environmental Audit Regulation, Official Gazette No. 27061 dated November 21, 2008;
- Packaging Waste Control Regulation, Official Gazette No. 26562 dated June 24, 2007 and revised in Official Gazette No. 27046 dated November 6, 2008; and
- Waste Batteries and Accumulators Control Regulation, Official Gazette No. 25569 dated August 31, 2004 and revised in Official Gazette No. 25744 dated March 03, 2005;
- The Excavation, Construction and Demolition Waste Control Regulation, Official Gazette No. 25406 dated March 18, 2004;
- Soil Pollution Control Regulation, Official Gazette No. 25831 dated May 31, 2005;
- Regulation Related to Workplace Opening and Operation Permits, Official Gazette No. 25902 dated August 10, 2005 and revised in Official Gazette No. 26492 dated April 13, 2007;
- Industrial Air Pollution Control Regulation, Official Gazette No. 27277 dated July 3, 2009
- Air Quality Assessment and Management Regulation, Official Gazette No. 26898 dated June 6, 2008 and revised in Official Gazette No. 27219 and dated May 5, 2009;
- Air Pollution Control Regulation For Heating Sources, Official Gazette No. 25699 dated January 13, 2005 and revised in Official Gazette No. 27134 dated February 07, 2009;
- Exhaust Gases Emission Control Regulation, Official Gazette No. 27190 dated April 04, 2009; and
- Regulation on Protection of Wetlands, Official Gazette No. 25818 dated May 17, 2005.
- In addition to the Environmental Law and its associated regulations, there are several other laws that directly or indirectly include environmental review, and thus, are applicable to the proposed project. The project will comply with the 4857 numbered Labour Law and its regulations stated below:

- Health and Safety Regulation for Construction Works, Official Gazette No. 25325 dated December 23, 2003;
- Regulation on Health and Safety Regarding Temporary Works, Official Gazette No. 25463 dated May 15, 2004.

Other regulations that the project will comply with can be listed as follows:

- 5346 numbered Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy;
- Regulation on Protection and Usage of Agricultural Lands, Official Gazette No. 25766 dated March 25, 2005;
- 2863 numbered Law on Protection of Cultural and Natural Heritage (revised by 5226 numbered Law);
- 4342 numbered Pasture Law;
- 6831 numbered Forestry Law (amended by 5192 numbered Revision in Forestry Law);

Regulation on Buildings located on the Disaster Areas, Official Gazette No. 26582 dated July 14, 2007;

APPENDIX II: BASELINE INFORMATION

Table 1: <http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/47.xls>

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKIT MİKTARLARININ ÜRETİCİ KURULUŞLARA DAĞILIMININ YILLAR İTİBARIYLA GELİŞİMİ (BİRLEŞİK İSİ-ELEKTRİK SANTRALLARINDA İSİ ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL) ANNUAL DEVELOPMENT OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES (FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)					
Birim(Unit):Ton/Gaz(gas) 10 ³ m ³					
			2009	2010	2011
EÜAŞ VE BAĞLI ORTAKLIKLARI EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ	Taşkömürü	Hard Coal	1,664,859	1,563,792	1,700,458
	Linyit	Lignite	57,850,129	50,123,941	54,558,282
	TOPLAM	TOTAL	59,514,988	51,687,733	56,258,740
	Fuel-Oil	Main Fuel	239,410	16,864	27,098
	Fuel Oil	Auxiliary Fuel	134,007	105,073	118,439
	TOPLAM	TOTAL	373,417	121,937	145,537
	Motorin	Main Fuel	45,364	4	0
	Diesel Oil	Auxiliary Fuel	72,956	18,901	13,984
	TOPLAM	TOTAL	118,320	18,905	13,984
	TOPLAM	TOTAL	491,737	140,842	159,521
MOBİL SANTRALLAR MOBILE POWER PLANTS	Doğal Gaz	Natural Gas	5,091,011	4,493,275	4,173,420
	Fuel-Oil	Fuel Oil	0	0	0
	Motorin	Diesel Oil	0	0	0
	TOPLAM	TOTAL	0	0	0
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ	Taşkömürü+İthal kömür	Hard Coal+Imported Coal	4,956,318	5,855,911	8,873,976
	Linyit	Lignite	5,770,389	6,565,451	6,949,028
	TOPLAM	TOTAL	10,726,707	12,421,362	15,823,004
	Fuel-Oil	Fuel Oil	1,220,904	769,845	386,071
	Motorin	Diesel Oil	62,537	1,449	1,063
	LPG	LPG	111	0	0
	Nafta	Naphtha	8,077	13,140	0
	TOPLAM	TOTAL	1,291,629	784,434	387,134
	Doğal Gaz	Natural Gas	15,887,029	17,290,139	18,631,167
	TOPLAM	TOTAL	26,613,736	29,711,501	34,454,172
TÜRKİYE TURKEY	Taşkömürü+İthal kömür	Hard Coal+Imported Coal	6,621,177	7,419,703	10,574,434
	Linyit	Lignite	63,620,518	56,689,392	61,507,310
	TOPLAM	TOTAL	70,241,695	64,109,095	72,081,744
	Fuel-Oil	Fuel Oil	1,594,321	891,782	531,608
	Motorin	Diesel Oil	180,857	20,354	15,047
	LPG	LPG	111	0	0
	Nafta	Naphtha	8,077	13,140	0
	TOPLAM	TOTAL	1,783,366	925,276	546,655
	Doğal Gaz	Natural Gas	20,978,040	21,783,414	22,804,587
	TOPLAM	TOTAL	91,222,741	86,892,509	104,886,389

Not:Ayrıca Otoprodüktör santrallerde kullanılan Ağaç Kabuğu, Talaş, Sıvı Kükürt, Siyah Likör, Katran, Kükürt keki , Kok Gazı, YF Gazı Rafineri gazı,Biogaz ve Endüstriyel atık ile ilgili miktarlar tabloda yer almamaktadır.

Note: Quantities of Wood Wastes, Liquid Sulphur, Black Liquor, Bitumen Pyrite, Sulphur Cake etc. and Natural Gas, Coke Oven Gas , Blast Furnace Gas and Refinery Gas values used by autoproducers are not included in the table.

* ADÜAŞ'ın lisansı Eylül 2008 tarihinde serbest üretim lisansına dönüştürülmüştür.

ADÜAŞ's license has been turned into the IPP license in September 2008

Table-2: IPCC Default CO₂ Emission Factors

Fuel Type:	EF (tCO ₂ /TJ)
Coal	92.80
Lignite	90.90
Fuel Oil	75.50
Diesel	72.60
LPG	61.60
Naphtha	69.30
Natural Gas	54.30
Bitumen	73.00

Table 3:

Source: <http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/49.xls>

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKITLARIN KURULUŞLARA GÖRE ISI DEĞERLERİ (BİRLEŞİK İSİ-ELEKTRİK SANTRALLARINDA İSİ ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL) HEATING VALUES OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES (FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)			Birim(Unit): Tcal		
			2009	2010	2011
EÜAŞ VE BAĞLI ORTAKLIKLARI EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ	Taşkömürü	Hard Coal	5,452	4,990	5,511
	Linyit	Lignite	83,356	80,967	91,352
	TOPLAM	Total	88,809	85,957	96,863
	Fuel-Oil	Fuel Oil	2,301	162	261
	Motorin	Diesel Oil	1,286	1,009	1,137
	TOPLAM	TOTAL	3,587	1,171	1,398
	Motorin	Diesel Oil	467	0	0
	TOPLAM	TOTAL	751	195	144
	TOPLAM	TOTAL	1,219	195	144
	TOPLAM	TOTAL	4,806	1,366	1,542
MOBİL SANTRALLAR MOBIL POWER PLANTS	Doğal Gaz	Natural Gas	42,335	37,354	34,621
	TOPLAM	TOTAL	135,949	124,676	133,026
	Fuel-Oil	Fuel Oil	0	0	0
	Motorin	Diesel Oil	0	0	0
	TOPLAM	TOTAL	0	0	0
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ	Taşkömürü+İthal kömür	Hard Coal+Imported Coal	29,677	34,556	52,056
	Linyit	Lignite	14,295	15,584	15,857
	TOPLAM	Total	43,973	50,141	67,914
	Fuel-Oil	Fuel Oil	11,573	7,398	3,882
	Motorin	Diesel Oil	612	15	11
	Lpg	Lpg	1	0	0
	Nafta	Naphta	84	105	0
	TOPLAM	TOTAL	12,270	7,518	3,893
	Doğal Gaz	Natural Gas	143,931	157,134	167,443
	TOPLAM	TOTAL	187,904	207,275	235,357
TÜRKİYE TURKEY	Taşkömürü+İthal kömür	Hard Coal+Imported Coal	35,130	39,546	57,567
	Linyit	Lignite	97,652	96,551	107,210
	TOPLAM	Total	132,781	136,097	164,777
	Fuel-Oil	Fuel Oil	15,160	8,569	5,280
	Motorin	Diesel Oil	1,830	209	155
	Lpg	Lpg	1	0	0
	Nafta	Naphta	84	105	0
	TOPLAM	TOTAL	17,076	8,884	5,435
	Doğal Gaz	Natural Gas	186,266	194,487	202,064
	TOPLAM	TOTAL	336,123	339,468	372,276

Not 1 :Ayrıca Ağaç kabuğu,talaş,sıvı kükürt,siyah likör,katran,kok gazı,YF gazı,rafineri gazı v.b otoprodüktör santrallarda kullanılan yakıtların ısı değerleri tabloda yer almamaktadır.

Note 1: Heating values of wood wastes,liquid sulphur,black liquor,bitumen,coke oven gas,blast furnace gas,refinery gas used by autoproducers are not included in the table.

Table 4:

Source: Computation based on Table 3 (in Annex-2) provided above.

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKITLARIN KURULUŞLARA GÖRE ISI DEĞERLERİ (BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL) HEATING VALUES OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES (FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED) 1cal = 4,1868 Joule				
Birim(Unit): Gjoule				
EÜAŞ VE BAĞLI ORTAKLIKLARI			2009	2010
			2011	
EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ	Taşkömürü	Hard Coal	22,828,163	20,892,383
	Linyit	Lignite	348,995,433	338,990,622
	TOPLAM	Total	371,823,595	359,883,005
	Fuel-Oil	Fuel Oil	9,632,696	679,656
	Yrd. Yakıt	Auxiliary Fuel	5,386,180	4,223,229
	TOPLAM	TOTAL	15,018,876	4,902,885
	Motorin	Diesel Oil	1,956,278	159
	Yrd. Yakıt	Auxiliary Fuel	3,146,162	815,082
	TOPLAM	TOTAL	5,102,441	815,241
	TOPLAM	TOTAL	20,121,317	5,718,126
MOBİL SANTRALLAR MOBIL POWER PLANTS	Doğal Gaz	Natural Gas	177,247,713	156,392,061
	TOPLAM	TOTAL	569,192,626	521,993,192
	TOPLAM	TOTAL	569,192,626	521,993,192
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ	Taşkömürü+İthal kömür	Hard Coal+Imported Coal	124,253,075	144,680,890
	Linyit	Lignite	59,852,102	65,249,084
	TOPLAM	Total	184,105,177	209,929,975
	Fuel-Oil	Fuel Oil	48,452,601	30,974,336
	Motorin	Diesel Oil	2,560,350	61,818
	Lpg	Lpg	5,158	0
	Nafta	Naphta	352,524	440,154
	TOPLAM	TOTAL	51,370,633	31,476,308
	Doğal Gaz	Natural Gas	602,609,967	657,887,178
	TOPLAM	TOTAL	786,715,144	867,817,153
TÜRKİYE TURKEY	Taşkömürü+İthal kömür	Hard Coal+Imported Coal	147,081,237	165,573,274
	Linyit	Lignite	408,847,535	404,239,706
	TOPLAM	Total	555,928,772	569,812,980
	Fuel-Oil	Fuel Oil	63,471,478	35,877,221
	Motorin	Diesel Oil	7,662,790	877,059
	Lpg	Lpg	5,158	0
	Nafta	Naphta	352,524	440,154
	TOPLAM	TOTAL	71,491,950	37,194,434
	Doğal Gaz	Natural Gas	779,857,681	814,279,239
	TOPLAM	TOTAL	1,407,278,403	1,421,286,653

Table 5:

Source: Computation based on Table 3 (in Annex-2) provided above.

NET CALORIFIC VALUES OF FUELS CONSUMED IN THE THERMAL POWER PLANTS				
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Unit: TJ/KT						
			2009	2010	2011	
EÜAŞ VE BAĞLI ORTAKLIKLARI EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ	Taşkömürü	Hard Coal	13.71	13.36	13.57	
	Linyit	Lignite	6.03	6.76	7.01	
	TOPLAM	TOTAL	6.25	6.96	7.21	
	Fuel-Oil	Fuel Oil	40.24	40.30	40.27	
		Asıl Yakıt Main Fuel	40.19	40.19	40.19	
		Yrd. Yakıt Auxiliary Fuel	40.22	40.21	40.21	
	Motorin	Diesel Oil	0.00	1.00	0.00	
		Asıl Yakıt Main Fuel	43.12	43.12	43.17	
		Yrd. Yakıt Auxiliary Fuel	43.12	43.12	43.17	
	TOPLAM	TOTAL	40.92	40.60	40.47	
MOBİL SANTRALLAR MOBILE POWER PLANTS	Doğal Gaz	Natural Gas	34.82	34.81	34.73	
	Fuel-Oil	Fuel Oil	0.00	0.00	0.00	
	Motorin	Diesel Oil	0.00	0.00	0.00	
	TOPLAM	TOTAL	0.00	0.00	0.00	
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ	Taşkömür+İthal kömür	Hard Coal+Imported Coal	25.07	24.71	24.56	
	Linyit	Lignite	10.37	9.94	9.55	
	TOPLAM	TOTAL	17.16	16.90	17.97	
	Fuel-Oil	Fuel Oil	39.69	40.23	42.10	
	Motorin	Diesel Oil	40.94	42.66	42.85	
	LPG	LPG	0.00	1.00	0.00	
	Nafta	Naphta	43.65	33.50	0.00	
	TOPLAM	TOTAL	39.77	40.13	42.10	
	Doğal Gaz	Natural Gas	37.93	38.05	37.63	
	TÜRKİYE TURKEY	Taşkömür+İthal kömür	Hard Coal+Imported Coal	22.21	22.32	22.79
Linyit		Lignite	6.43	7.13	7.30	
TOPLAM		TOTAL	7.91	8.89	9.57	
Fuel-Oil		Fuel Oil	39.81	40.23	41.58	
Motorin		Diesel Oil	42.37	43.09	43.15	
LPG		LPG	46.47	0.00	0.00	
Nafta		Naphta	43.65	33.50	0.00	
TOPLAM		TOTAL	40.09	40.20	41.63	
Doğal Gaz		Natural Gas	37.17	37.38	37.10	

Table 6:

Source: [http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim\(22-45\)/40\(06-11\).xls](http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim(22-45)/40(06-11).xls)

TÜRKİYE BRÜT ELEKTRİK ENERJİSİ ÜRETİMİNİN ÜRETİCİ KURULUŞLAR VE BİRİNCİL ENERJİ KAYNAKLARINA DAĞILIMI TURKEY'S GROSS ELECTRICITY GENERATION BY PRIMARY ENERGY RESOURCES AND THE ELECTRIC UTILITIES			Birim(Unit) : GWh		
ÜRETİM KARAKTERİSTİĞİ Generation Characteristics			2009	2010	2011
E Ü A Ş	TAŞKÖMÜRÜ	Hard Coal	1,851.1	1,882.7	2,004.2
	LİNYİT	Lignite	22,395.3	20,646.7	20,588.7
	KÖMÜR TOPLAMI	Coal Total	24,246.4	22,529.4	22,592.9
	FUEL-OİL	Fuel Oil	974.4	62.2	103.0
	MOTORİN	Diesel oil	0.2	0.0	0.0
	SIVI TOPLAMI	Liquid Total	974.6	62.2	103.0
	DOĞAL GAZ	Natural Gas	17,225.5	15,289.4	13,939.9
	TERMİK TOPLAM	Thermal Total	42,446.5	37,881.0	36,635.9
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	Hydro+Geothermal+Wind Total	28,338.2	41,377.4	36,888.2
	TOPLAM	Total	70,784.8	79,258.3	73,524.1
BAĞLI ORTAKLIKLAR Affiliated partnerships Of EÜAŞ	LİNYİT	Lignite	11,974.5	10,524.2	13,407.6
	DOĞAL GAZ	Natural Gas	6,694.4	5,749.9	5,419.0
	TERMİK TOPLAM	Thermal Total	18,668.9	16,274.1	18,826.5
MOBİL SANTRALLAR MOBILE P.P.	FUEL-OİL	Fuel Oil	0.0	0.0	0.0
	MOTORİN	Diesel oil	0.0	0.0	0.0
	TERMİK TOPLAM	Thermal Total	0.0	0.0	0.0
OTOPRODÜKTÖRLER ÜRETİM ŞRK. İŞLETME HAKKI DEV. Autoproducers Production Comp. TOOR	TAŞKÖMÜRÜ+İTHAL KÖMÜR	Hard Coal+Imported Coal	14,744.5	17,221.6	25,343.3
	LİNYİT	Lignite	4,719.6	4,771.2	4,874.1
	KÖMÜR TOPLAMI	Coal Total	19,464.1	21,992.8	30,217.4
	FUEL-OİL	Fuel Oil	3,465.4	2,081.6	797.5
	MOTORİN	Diesel oil	345.6	4.3	3.1
	LPG	LPG	0.4	0.0	0.0
	NAFTA	Naphtha	17.6	31.9	0.0
	SIVI TOPLAMI	Liquid Total	3,829.0	2,117.8	800.6
	DOĞAL GAZ	Natural Gas	72,174.8	77,104.5	84,688.7
	YENİLENEBİLİR+ATIK	Renewables and wastes	340.1	457.0	340.1
	TERMİK TOPLAM	Thermal Total	95,808.0	101,672.5	116,046.8
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	Hydro+Geothermal+Wind Total	9,551.2	14,002.8	20,868.6
	TOPLAM	Total	105,359.2	115,675.3	136,915.4
TÜRKİYE TURKEY	TAŞKÖMÜRÜ+İTHAL KÖMÜR	Hard Coal+Imported Coal	16,595.6	19,104.3	27,347.5
	LİNYİT	Lignite	39,089.5	35,942.1	38,870.4
	KÖMÜR TOPLAMI	Coal Total	55,685.1	55,046.4	66,217.9
	FUEL-OİL	Fuel Oil	4,439.8	2,143.8	900.5
	MOTORİN	Diesel oil	345.8	4.3	3.1
	LPG	LPG	0.4	0.0	0.0
	NAFTA	Naphtha	17.6	31.9	0.0
	SIVI TOPLAMI	Liquid Total	4,803.5	2,180.0	903.6
	DOĞAL GAZ	Natural Gas	96,094.7	98,143.7	104,047.6
	YENİLENEBİLİR+ATIK	Renewables and wastes	340.1	457.5	469.2
	TERMİK TOPLAM	Thermal Total	156,923.4	155,827.6	171,638.3
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	Hydro+Geothermal+Wind Total	37,889.5	55,380.1	57,756.8
	TÜRKİYE TOPLAMI	TURKEY'S TOTAL	194,812.9	211,207.7	229,395.1

Table 7: (Source: [http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim\(22-45\)/33\(84-11\).xls](http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls))

TÜRKİYE ELEKTRİK ENERJİSİ ÜRETİM - TÜKETİM VE KAYIPLARININ YILLAR İTİBARIYLA GELİŞİMİ
ANNUAL DEVELOPMENT OF ELECTRICITY GENERATION, CONSUMPTION AND LOSSES IN TURKEY
(1984-2011)

Source: [http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim\(22-45\)/33\(84-11\).xls](http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls)

YILLAR YEARS	BRÜT ÜRETİM GROSS GEN.	ARTIŞ % INCREASE	İÇ İHTİYAÇ % INTERNAL CONSUMPTION	NET ÜRETİM NET GEN.	İTHALAT IMPORTS	ŞEBEKE KAYBI THE NETWORK ¹⁾		İLETİM TRANSMISSION	%	DAĞITIM DISTRIBUTION	%	TOPLAM TOTAL	%	İHRACAT ²⁾ EXPORTS ²⁾	NET TÜKETİM NET CONS.	ARTIŞ % INCREASE
						ŞEBEKEYE VERİLEN ¹⁾ SUPPLIED TO	İTHALAT IMPORTS									
1984	30613.5	11.9	1890.7	6.2	28722.8	2653.0	31375.8	1577.4	5.0	2163.2		3740.6	11.9	27635.2		13.0
1985	34218.9	11.8	2206.8	6.7	31912.1	2142.4	34054.5	1611.4	4.7	2734.5		4345.9	12.8	29708.6		7.5
1986	39994.8	16.0	2815.0	7.1	36879.8	776.6	37656.4	1344.3	3.6	4102.4		5446.7	14.5	32209.7		8.4
1987	44352.9	11.7	2607.7	5.9	41745.2	572.1	42317.3	1627.4	3.8	3992.6		5620.0	13.3	36697.3		13.9
1988	48048.8	8.3	2400.0	5.0	45648.8	381.2	46030.0	2016.6	4.4	4291.9		6308.5	13.7	39721.5		8.2
1989	52043.2	8.3	3234.5	6.2	48808.7	558.5	49367.2	1544.0	3.1	4703.2		6247.2	12.7	43120.0		8.6
1990	57543.0	10.6	3311.4	5.8	54231.6	175.5	54407.1	1787.2	3.3	4893.1		6680.3	12.3	46820.0		8.6
1991	60246.3	4.7	3655.2	6.1	56591.1	759.4	57350.5	1437.8	2.5	6123.4		7561.2	13.2	49282.9		5.3
1992	67342.2	11.8	4237.3	6.3	63104.9	188.8	63293.7	1342.9	2.1	7651.9		8994.8	14.2	53984.7		9.5
1993	73807.5	9.6	3943.1	5.3	69864.4	212.9	70077.3	1634.9	2.3	8616.7		10251.6	14.6	59237.0		9.7
1994	78321.7	6.1	4539.1	5.8	73782.6	31.4	73814.0	1800.3	2.4	10042.7	*	11843.0	16.0	61400.9	*	3.7
1995	86247.4	10.1	4388.8	5.1	81858.6	0	81858.6	2034.9	2.5	11733.9	*	13768.8	16.8	67393.9	*	9.8
1996	94861.7	10.0	4777.3	5.0	90084.4	270.1	90354.5	2461.7	2.7	13393.1	*	15854.8	17.5	74156.6	*	10.0
1997	103295.8	8.9	5050.2	4.9	98245.6	2492.3	100737.9	2935.5	2.9	15646.4	*	18581.9	18.4	81885.0	*	10.4
1998	111022.4	7.5	5523.2	5.0	105499.2	3298.5	108797.7	3337.1	3.1	17457.8	*	20794.9	19.1	87704.6	*	7.1
1999	116439.9	4.9	5738.0	4.9	110701.9	2330.3	113032.2	2985.1	2.6	18559.9	*	21545.0	19.1	91201.9	*	4.0
2000	124921.6	7.3	6224.0	5.0	118697.6	3791.3	122488.9	3181.8	2.6	20574.1	*	23755.9	19.4	98295.7	*	7.8
2001	122724.7	-1.8	6472.6	5.3	116252.1	4579.4	120831.5	3374.4	2.8	19954.3	*	23328.7	19.3	97070.0	*	-1.2
2002	129099.5	5.4	5672.7	4.4	123726.8	3588.2	127315.0	3440.7	2.7	20491.2	*	23931.9	18.8	102948.0	*	6.1
2003	140580.5	8.6	5332.2	3.8	135248.3	1158.0	136406.3	3330.7	2.4	20722.0	*	24052.7	17.6	111766.0	*	8.6
2004	150698.3	7.2	5632.6	3.7	145065.7	463.5	145529.2	3422.8	2.4	19820.2	*	23243.0	16.0	121141.9	*	8.4
2005	161956.2	7.5	6487.1	4.0	155469.1	635.9	156105.0	3695.3	2.4	20348.7	*	24044.0	15.4	130262.9	*	7.5
2006	176299.8	8.9	6756.7	3.8	169543.1	573.2	170116.3	4543.8	2.7	19245.4	*	23789.2	14.0	144091.4	*	10.6
2007	191558.1	8.7	8218.4	4.3	183339.7	864.3	184204.0	4523.0	2.5	22123.6	*	26646.6	14.5	155135.2	*	7.7
2008	198418.0	3.6	8656.1	4.4	189761.9	789.4	190551.3	4388.4	2.3	23093.1	*	27481.5	14.4	161947.6	*	4.4
2009	194812.9	-1.8	8193.6	4.2	186619.3	812.0	187431.3	3973.4	2.1	25018.0	*	28991.4	15.5	156894.1	*	-3.1
2010	211207.7	8.4	8161.6	3.9	203046.1	1143.8	204189.9	5690.5	2.8	24531.2	*	30221.7	14.8	172050.6	*	9.7
2011	229395.1	8.6	11837.4	5.2	217557.7	4555.8	222113.5	4189.3	1.9	28180.0	*	32369.3	14.6	186099.6		8.2

1) Şebekeye Verilen = Net Üretim + İthalat

2) İhracat, Enerji teslim esasına göre yapıldığından, ihracat ile ilgili şebeke kayıpları, iletim kayıplarının içinde yer almaktadır.

* Kaynak : Türkiye Elektrik Dağıtım ve Tüketim İstatistikleri, 1994-2010 (2011 Geçici)

1) Supplied to the Network = Net Generation + Import

2) As the export is made on delivery at border basis, its losses are included in the section for transmission network losses.

* Source : Electricity Distribution and Consumption Statistics of Turkey, 1994-2010

Table 8a:

Source: <http://www.teias.gov.tr/KAPASITEPROJEKSİYONU2011.pdf>

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	D Com
SELİMOĞLU REG. VE HES	0.00	0.00	0.00	Private	Hydro	
KULP IV HES (YILDIZLAR EN.ELK.ÜR.AŞ.)	12.30	41.00	23.00	Private	Hydro	
TUZLA JEOTERMAL	0.00	0.00	0.00	Private	Geothermal	
ROTOR ELEKTRİK (OSMANİYE RES)	0.00	0.00	0.00	Private	Wind	
CİNDERE HES (İlave)	9.07	28.29	16.07	Private	Hydro	
ETİ SODA ÜRE.PAZ.NAK.VE ELK.ÜRE.SAN.	24.00	144.00	144.00	Auto producer	Lignite	
BAYBURT HES (BAYBURT ENERJİ ÜRET.)	14,6	51.00	24.00	Private	Hydro	
UZUNÇAYIR HES (Tunceli) (İlave)	0.00	0.00	0.00	Private	Hydro	
ALTINMARKA	4.60	37.02	37.02	Auto producer	Natural Gas	
CAN TEKSTİL (Çorlu/TEKİRDAĞ)	7.83	60.25	60.25	Auto producer	Natural Gas	
ALAKIR HES (YURT ENERJİ ÜRETİM)	2.06	6.00	4.00	Private	Hydro	
CEV ENERJİ ÜRETİM (GAZİANTEP ÇÖP Biogas)	0.00	0.00	0.00	Private	Biogas	
AKBAŞLAR (İlave)	1.54	1.54	12.08	Auto producer	Natural Gas	
ASA ENERJİ (KALE REG.ve HES)	9,6	0.00	0.00	Private	Hydro	
PETA MÜHENDİSLİK EN. (MURSAL II HES)	4.50	19.00	11.00	Private	Hydro	
HETAŞ HACISALİHOĞLU (YILDIZLI HES)	1.20	5.00	3.00	Private	Hydro	
ORTADOĞU ENERJİ (ODA YERİ) (Eyüp/İST.)	0.00	0.00	0.00	Private	LFG	
KONYA ŞEKER SAN. VE TİC. A.Ş.1	6.00	36.00	36.00	Auto producer	Lignite	
GLOBAL ENERJİ (PELİTLİK)	3.54	27.06	27.06	Private	Natural Gas	
ASMAKİNSAN (BANDIRMA 3 RES)	20.00	0.00	0.00	Private	Wind	
FLOKSER Tekstil (Çatalça-İstanbul)(Süetser tesisi)	-2.13	0.00	0.00	Auto producer	Natural Gas	
RASA ENERJİ (VAN)	26.19	166.62	166.62	Private	Natural Gas	
ROTOR ELEKTRİK (OSMANİYE RES)	17.50	0.00	0.00	Private	Wind	
SOMA ENERJİ ÜRETİM (SOMA RES)	4.50	0.00	0.00	Private	Wind	
DOĞUBAY ELEKTRİK (SARİMEHMET HES)	3.10	10.00	6.00	Private	Hydro	
DENİZ ELEKTRİK (SEBENOBA RES)	10.00	0.00	0.00	Private	Wind	
AKDENİZ ELEKTRİK (MERSİN RES)	33,0	0.00	0.00	Private	Wind	
AKSA ENERJİ (ANTALYA)	25.00	192.50	192.50	Private	Natural Gas	
NURYOL ENERJİ (DEFNE REG. VE HES)	7.23	22.00	13.00	Private	Hydro	
MENDERES GEOTERMAL DORA-2	0.00	0.00	0.00	Private	Jeothermal	
ASMAKİNSAN (BANDIRMA 3 RES)	4.00	0.00	0.00	Private	Wind	
ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	5.91	0.00	0.00	Private	Hydro	
BİRİM HİDR. ÜRETİM AŞ. (ERFELEK HES)	3.23	9.50	5.50	Private	Hydro	
BEYTEK EL. ÜR. A.Ş. (ÇATALOLUK HES)	9,5	0.00	0.00	Private	Hydro	
NİSAN E.MEKANİK EN. (BAŞAK REG. HES)	6.85	22.00	12.00	Private	Hydro	

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
BOREAS ENERJİ (BOREAS I ENEZ RES)	15,0	0.00	0.00	Private	Wind	9-Apr-10
UZUNÇAYIR HES (Tunceli) (İlave)	27.33	0.00	0.00	Private	Hydro	11-Apr-10
FIRTINA ELEKTRİK ÜR. A.Ş. (SÜMER HES)	21.60	59.41	33.27	Private	Hydro	16-Apr-10
FRİTOLAY GIDA SAN.VE TİC A.Ş.	0.07	4.00	4.00	Auto producer	Biogas	21-Apr-10
YILDIZ ENTEGRE AĞAÇ (Kocaeli)	12.37	79.79	79.79	Auto producer	Natural Gas	22-Apr-10
BAKRAS EN. ELKT.ÜR. A.Ş. ŞENBÜK RES	15,0	0.00	0.00	Private	Wind	22-Apr-10
ALİZE ENERJİ (KELTEPE RES)	1.80	0.00	0.00	Private	Wind	28-Apr-10
KAR-EN KARADENİZ EL.A.Ş. ARALIK HES	12.41	56.00	32.00	Private	Hydro	30-Apr-10
ITC-KA ENERJİ (SİNCAN)	0.00	0.00	0.00	Private	LFG	30-Apr-10
ATAER ENERJİ ELEKTRİK ÜRETİM A.Ş.	49.00	277.89	277.89	Private	Natural Gas	5-May-10
BİRİM HİDR. ÜRETİM AŞ. (ERFELEK HES)	3.23	9.50	5.50	Private	Hydro	14-May-10
CENGİZ ENERJİ SAN. VE TİC. A.Ş. (Tekkeköy)	101.95	802.00	802.00	Private	Natural Gas	22-May-10
KARADENİZ EL.ÜRET. (UZUNDERE-1 HES)	31.08	82.44	46.46	Private	Hydro	27-May-10
SİMKO(Kartal)	-2.05	0.00	0.00	Auto producer	Natural Gas	27-May-10
AKIM ENERJİ (CEVİZLİK REG. VE HES)	91,4	0.00	0.00	Private	Hydro	28-May-10
CEYHAN HES (OŞKAN HES) (ENOVA EN.)	23.89	0.00	0.00	Private	Hydro	3-Jun-10
ERENLER REG. ve HES (BME BİR.MÜT.EN.)	45.00	85.00	48.00	Private	Hydro	4-Jun-10
ROTOR ELEKTRİK (GÖKÇEDAĞ RES)	20.00	0.00	0.00	Private	Wind	5-Jun-10
ÇAKIT HES (ÇAKIT ENERJİ A.Ş.)	20.18	0.00	0.00	Private	Hydro	10-Jun-10
SOMA ENERJİ ÜRETİM (SOMA RES)	7.20	0.00	0.00	Private	Wind	10-Jun-10
PAŞA REG. VE HES (ÖZGÜR ELEKTRİK)	8.68	0.00	0.00	Private	Hydro	11-Jun-10
GÜZELÇAY-I HES (İLK ELEKTRİK ENERJİ)	3.14	16.67	9.30	Private	Hydro	15-Jun-10
KALE REG. VE HES (KALE ENERJİ ÜR.)	34.14	0.00	0.00	Private	Hydro	16-Jun-10
BERGAMA RES EN. ÜR. A.Ş. ALİAĞA RES	37.50	0.00	0.00	Private	Wind	16-Jun-10
MAZI-3 RES ELEKTRİK (MAZI-3 RES)	7.50	0.00	0.00	Private	Wind	18-Jun-10
UĞUR ENERJİ ÜRETİM TİC. VE SAN. A.Ş.	48.20	405.14	405.14	Private	Natural Gas	21-Jun-10
SÖKTAŞ (N+LPG)(Aydın)	-4.50			Auto producer	NAFTA	23-Jun-10
ÇAMLIKAYA REG. VE HES	5.65	19.00	11.00	Private	Hydro	30-Jun-10
ERİKLİ-AKOCAN REG. ve AKOCAN HES	41.25	0.00	0.00	Private	Hydro	30-Jun-10
BORASKO ENERJİ (BANDIRMA RES)	12.00	0.00	0.00	Private	Wind	30-Jun-10
AKSA ENERJİ (ANTALYA)	25.00	192.50	192.50	Private	Natural Gas	1-Jul-10
DİNAR HES (ELDA ELEKTRİK ÜRETİM)	4.44	15.00	9.00	Private	Hydro	3-Jul-10
DAMLAPINAR HES (CENAY ELEKTRİK ÜR.)	16.42	92.00	0.00	Private	Hydro	8-Jul-10
DİM HES (DİLER ELEKTRİK ÜRETİM)	38.25	123.00	70.00	Private	Hydro	8-Jul-10
ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	5.91	0.00	0.00	Private	Hydro	10-Jul-10
ALTEK ALARKO ELEKTRİK SANTRALLARI	60.10	415.57	415.57	Private	Natural Gas	10-Jul-10
KİRPİLİK REG. VE HES (ÖZGÜR ELEKTRİK)	6.24	22.00	13.00	Private	Hydro	11-Jul-10

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
YAVUZ REG. VE HES (MASAT ENERJİ)	22.50	0.00	0.00	Private	Hydro	14-Jul-10
EREN ENERJİ ELEKTRİK ÜRETİM A.Ş.	160.00	4,005.88	4,005.88	Private	Coal	15-Jul-10
ZİYARET RES (ZİYARET RES ELEKTRİK)	12.50	0.00	0.00	Private	Wind	15-Jul-10
FLOKSER TEKSTİL (Çerkezköy/TEKİRDAĞ)	5.17	42.00	42.00	Autoproducer	Natural Gas	17-Jul-10
KAYABÜKÜ REG. VE HES (ELİTE ELEKT.)	14.58	0.00	0.00	Private	Hydro	21-Jul-10
RB KARESİ İTHALAT İHRACAT TEKSTİL	8.60	65.00	65.00	Autoproducer	Natural Gas	23-Jul-10
SOMA ENERJİ ÜRETİM (SOMA RES)	7.20	0.00	0.00	Private	Wind	28-Jul-10
ERİKLİ-AKOC AK REG. ve AKOC AK HES	41.25	0.00	0.00	Private	Hydro	29-Jul-10
CENGİZ ENERJİ SAN. VE TİC. A.Ş. (Tekkeköy)	101.95	802.00	802.00	Private	Natural Gas	31-Jul-10
GÖK REG. ve HES (GÖK ENERJİ EL. SAN.)	10.01	43.00	24.00	Private	Hydro	6-Aug-10
BULAM REG. VE HES (MEM ENERJİ ELK.)	7.03	0.00	0.00	Private	Hydro	10-Aug-10
KESKİNOĞLU TAVUKÇULUK VE DAM. İŞL.	3.50	25.00	25.00	Autoproducer	Natural Gas	11-Aug-10
SOMA RES (BİLGİN Wind SAN. EN.ÜR.)	32.50	0.00	0.00	Private	Wind	13-Aug-10
BİNATOM ELEKTRİK ÜRETİM A.Ş.	2.00	13.00	13.00	Private	Natural Gas	17-Aug-10
KURTOĞLU BAKIR KURŞUN SAN. A.Ş.	1.59	12.00	12.00	Autoproducer	Natural Gas	19-Aug-10
CAN ENERJİ ELEKTRİK ÜR. A.Ş. (Tekirdağ)	29.10	203.00	203.00	Private	Natural Gas	19-Aug-10
CEYHAN HES (BERKMAN HES)(ENOVA EN.)	12.61	0.00	0.00	Private	Hydro	20-Aug-10
SOMA ENERJİ ÜRETİM (SOMA RES)	6.30	0.00	0.00	Private	Wind	20-Aug-10
GÜDÜL I REG. VE HES (YAŞAM ENERJİ)	2.36	14.00	8.00	Private	Hydro	25-Aug-10
SÖNMEZ ENERJİ ÜRETİM (UŞAK)	33.24	248.59	248.59	Private	Natural Gas	26-Aug-10
CEYHAN HES (BERKMAN HES)(ENOVA EN.)	12.61	0.00	0.00	Private	Hydro	28-Aug-10
KARŞIYAKA HES (AKUA ENERJİ ÜRET.)	1.59	0.00	5.00	Private	Hydro	28-Aug-10
ITC ADANA BİOKÜTLE SANT.	0.00	0.00	0.00	Private	LFG	2-Sep-10
BELEN ELEKTRİK (BELEN RES) (İlave)	6.00	0.00	0.00	Private	Wind	2-Sep-10
TEKTUĞ ELEKTRİK (ANDIRIN HES)	40.50	106.00	60.00	Private	Hydro	3-Sep-10
ÜTOPYA ELEKTRİK (DÜZOVA RES) (İlave)	15.00	0.00	0.00	Private	Wind	3-Sep-10
BERGAMA RES EN. ÜR. A.Ş. ALİAĞA RES	52.50	0.00	0.00	Private	Wind	4-Sep-10
ROTOR ELEKTRİK (OSMANİYE RES)	17.50	0.00	0.00	Private	Wind	4-Sep-10
SELEN ELEKTRİK (KEPEZKAYA HES)	28.00	0.00	0.00	Private	Hydro	6-Sep-10
REŞADİYE 2 HES (TURKON MNG ELEKT.)	26.14	0.00	0.00	Private	Hydro	17-Sep-10
KOZAN HES (SER-ER ENERJİ)	4.00	9.00	5.00	Private	Hydro	21-Sep-10
SOMA RES (BİLGİN Wind SAN) (İlave)	27.50	0.00	0.00	Private	Wind	23-Sep-10
KIRKA BORAKS(Kırka) (Eti Maden İşl.) (İlave)	10.00	65.93	65.93	Autoproducer	Natural Gas	29-Sep-10
KAHRAMAN REG. VE HES (KATIRCIOĞLU)	1.42	6.00	3.00	Private	Hydro	30-Sep-10
NARİNKALE REG. VE HES (EBD ENERJİ)	3.10	10.00	6.00	Private	Hydro	30-Sep-10
SOMA ENERJİ ÜRETİM (SOMA RES) (İlave)	9.00	0.00	0.00	Private	Wind	1-Oct-10
ERENKÖY REG. VE HES (TÜRKERLER)	21.46	87.00	49.00	Private	Hydro	7-Oct-10

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
ENERJİ-SA (BANDIRMA)	1,000.00	7,540.00	7,540.00	Private	Natural Gas	7-Oct-10
UĞUR ENERJİ ÜR. TİC.VE SAN. A.Ş. (İlave)	12.00	100.86	100.86	Private	Natural Gas	7-Oct-10
ZİYARET RES (ZİYARET RES ELEK.) (İlave)	22.50	0.00	0.00	Private	Wind	13-Oct-10
KAHTA I HES (ERDEMYILDIZ ELEK. ÜRT.)	7.12	0.00	0.00	Private	Hydro	14-Oct-10
ROTOR ELEKTRİK (GÖKÇEDAĞ RES) (İlave)	2.50	0.00	0.00	Private	Wind	15-Oct-10
AZMAK-II REG. VE HES (Düzeltilme)	-18.07	0.00	0.00	Private	Hydro	25-Oct-10
ITC ADANA BİOKÜTLE SANT. (Düzeltilme)	0.00	0.00	0.00	Private	LFG	25-Oct-10
ENERJİ-SA (BANDIRMA) (Düzeltilme)	-69.20	0.00	0.00	Private	Natural Gas	25-Oct-10
ULUABAT KUVVET TÜNELİ VE HES	48.51	0.00	0.00	Private	Hydro	27-Oct-10
SABUNSUYU II HES (ANG ENERJİ ELK.)	7.35	21.00	12.00	Private	Hydro	28-Oct-10
EREN ENERJİ ELEKTRİK ÜR. A.Ş. (İlave)	600.00	4,005.88	4,005.88	Private	Coal	1-Nov-10
BURÇ BENDİ VE HES (AKKUR ENERJİ)	27.33	0.00	0.00	Private	Hydro	4-Nov-10
KARADENİZ EL. (UZUNDERE-1 HES) (İlave)	31.08	82.44	46.46	Private	Hydro	7-Nov-10
GÜZELÇAY-II HES (İLK ELEKTRİK ENERJİ)	4.96	26.33	14.70	Private	Hydro	11-Nov-10
MURGUL BAKIR (Ç. Kaya) (İlave)	19.60	40.50	31.59	Private	Hydro	11-Nov-10
KUYUCAK RES (ALİZE ENERJİ ÜRET.)	8.00	0.00	0.00	Private	Wind	11-Nov-10
SOMA RES (BİLGİN Wind SAN.) (İlave)	30.00	0.00	0.00	Private	Wind	11-Nov-10
ULUABAT KUVVET TÜNELİ VE HES (İlave)	48.51	0.00	0.00	Private	Hydro	25-Nov-10
MARMARA PAMUKLU MENSUCAT (İlave)	26.19	203.45	203.45	Autoproducer	Natural Gas	25-Nov-10
FRİTOLAY GIDA SAN.VE TİC A.Ş. (İlave)	0.33	3.00	3.00	Autoproducer	Biogas	26-Nov-10
EGEMEN 1 HES (ENERSİS ELEKTRİK)	8.82	0.00	0.00	Private	Hydro	26-Nov-10
REŞADİYE 1 HES (TURKON MNG ELEKT.)	15.68	0.00	0.00	Private	Hydro	26-Nov-10
ALİAĞA ÇAKMAKTEPE ENERJİ (İlave)	69.84	557.92	557.92	Private	Natural Gas	26-Nov-10
YEDİGÖZE HES (YEDİGÖZE ELEKTRİK)	155.33	474.00	268.00	Private	Hydro	2-Dec-10
SÖNMEZ ENERJİ ÜRETİM (UŞAK) (İlave)	2.56	19.77	19.77	Private	Natural Gas	7-Dec-10
AK-ENERJİ (UŞAK OSB) (Uşak-Ak.en.)	-15.24	0.00	0.00	Private	Natural Gas	9-Dec-10
AK-ENERJİ (DG+N) (Deba-Denizli)	-15.60	0.00	0.00	Private	Natural Gas	9-Dec-10
KUYUCAK RES (ALİZE ENERJİ ÜR.) (İlave)	17.60	0.00	0.00	Private	Wind	9-Dec-10
UMUT III REG. VE HES (NİSAN ELEKTR.)	12.00	26.00	15.00	Private	Hydro	13-Dec-10
TÜPRAŞ RAFİNERİ (İZMİT) (İlave)	40.00	258.82	258.82	Autoproducer	Natural Gas	15-Dec-10
POLYPLEX EUROPA POLYESTER FİLM	7.81	61.00	61.00	Autoproducer	Natural Gas	16-Dec-10
ALTEK ALARKO ELEKTRİK SANTRALLARI	21.89	151.36	151.36	Private	Natural Gas	18-Dec-10
AKSA ENERJİ (Demirtaş/BURSA)	-1.40	0.00	0.00	Private	Waste	21-Dec-10
SARES RES (GARET ENERJİ ÜRETİM)	15.00	0.00	0.00	Private	Wind	22-Dec-10
FEKE 2 BARAJI VE HES (AKKUR ENERJİ)	69.34	0.00	0.00	Private	Hydro	24-Dec-10
EGEMEN 1B HES (ENERSİS ELEKTRİK)	11.10	0.00	0.00	Private	Hydro	28-Dec-10
EREN ENERJİ ELEKTRİK ÜR. A.Ş. (İlave)	600.00	4,005.88	4,005.88	Private	Coal	29-Dec-10

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
RASA ENERJİ (VAN) (ilave)	10.12	64.41	64.41	Private	Natural Gas	29-Dec-10
KALKANDERE REG. VE YOKUŞLU HES	14.54	0.00	0.00	Private	Hydro	30-Dec-10
TURGUTTEPE RES (SABAŞ ELEKTRİK ÜR.)	22.00	0.00	0.00	Private	Wind	30-Dec-10
AK TEKSTİL-1 (G.antep)	-13.04	0.00	0.00	Autoproducer	FUEL-OIL	31-Dec-10
SİLOPİ ELEKTRİK ÜR. A.Ş. (ESENBOĞA)	-44.78	0.00	0.00	Private	FUEL-OIL	31-Dec-10
INTERNATIONAL HOSPITAL İSTANBUL AŞ.	0.77	6.00	6.00	Autoproducer	Natural Gas	31-Dec-10
TÜPRAŞ RAFİNERİ (İZMİT) (Düzeltilme)	-39.14	0.00	0.00	Autoproducer	Natural Gas	31-Dec-10
YALOVA ELYAF	-12.30	0.00	0.00	Autoproducer	Natural Gas	31-Dec-10

Table 8b:

Source: <http://www.teias.gov.tr/KAPASITEPROJEKSİYONU2012.pdf>

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
AKIM ENERJİ BAŞPINAR (SÜPER FİLM)	25.32	177.00	177.00	PRIVATE	NATURAL GAS	Unknown
AKSA AKRILIK (İTHAL KÖM.+D.G)	25.00	175.00	175.00	PRIVATE	NATURAL GAS	Unknown
AKSA ENERJİ (Antalya)	300.00	1,800.00	1,800.00	PRIVATE	NATURAL GAS	Unknown
AKSA ENERJİ (Antalya) (İlave)	300.00	1,800.00	1,800.00	PRIVATE	NATURAL GAS	Unknown
ALDAŞ ALTYAPI YÖNETİM DANIŞMANLIK	1.95	15.00	15.00	AUTOPRODUCER	NATURAL GAS	Unknown
ALİAĞA ÇAKMAKTEPE ENERJİ (İlave)	130.95	986.25	986.25	PRIVATE	NATURAL GAS	Unknown
ALİAĞA ÇAKMAKTEPE ENERJİ (İlave)	8.73	67.76	67.76	PRIVATE	NATURAL GAS	Unknown
BEKİRLİ TES (İÇDAŞ ELEKTRİK EN.)	600.00	4.32	4.32	PRIVATE	IMPORTED COAL	Unknown
BOSEN ENERJİ ELEKTRİK ÜRETİM AŞ.	93.00	698.09	698.09	PRIVATE	NATURAL GAS	Unknown
BOYTEKS TEKSTİL SAN. VE TİC. A.Ş.	8.60	67.00	67.00	PRIVATE	NATURAL GAS	Unknown
CENGİZ ÇİFT YAKITLI K.Ç.E.S.	131.34	985.00	985.00	PRIVATE	NATURAL GAS	Unknown
CENGİZ ENERJİ SAN.VE TİC.A.Ş.	35.00	281.29	281.29	PRIVATE	NATURAL GAS	Unknown
ETİ BOR (Borik Asit)(Emet) (Düzeltilme)	0.60	4.47	4.47	AUTOPRODUCER	NATURAL GAS	Unknown
FRAPORT İC İÇTAŞ ANTALYA HAVALİMANI	8.00	64.00	64.00	AUTOPRODUCER	NATURAL GAS	Unknown
GLOBAL ENERJİ (PELİTLİK)	4.00	29.91	29.91	PRIVATE	NATURAL GAS	Unknown
GORDİON AVM (REDEVCO ÜÇ EMLAK)	2.01	15.00	15.00	AUTOPRODUCER	NATURAL GAS	Unknown
GÖREN-1 (GAZİANTEP ORGANİZE SAN.)	48.65	277.00	277.00	PRIVATE	NATURAL GAS	Unknown
GÜLLE ENERJİ(Çorlu) (İlave)	3.90	18.43	18.43	PRIVATE	NATURAL GAS	Unknown
HAMİTABAT (Lisans Tadili)	36.00	244.15	244.15	GOVERNMENT	NATURAL GAS	Unknown
HASIRCI TEKSTİL TİC. VE SAN. LTD. ŞTİ.	2.00	15.00	15.00	AUTOPRODUCER	NATURAL GAS	Unknown
HG ENERJİ ELEKTRİK ÜRET. SAN.TİC. A.Ş.	52.38	366.00	366.00	PRIVATE	NATURAL GAS	Unknown
ISPARTA MENSUCAT (Isparta)	4.30	33.00	33.00	AUTOPRODUCER	NATURAL GAS	Unknown
İSTANBUL SABİHA GÖKÇEN UL.AR. HAV.	4.00	32.00	32.00	AUTOPRODUCER	NATURAL GAS	Unknown
KARKEY (SİLOPİ 1)	100.44	697.67	697.67	PRIVATE	F.OIL	Unknown
KNAUF İNŞ. VE YAPI ELEMANLARI SN.	1.56	12.00	12.00	AUTOPRODUCER	NATURAL GAS	Unknown
LOKMAN HEKİM ENGÜRÜ SAĞ.(SİNCAN)	0.51	44.00	44.00	AUTOPRODUCER	NATURAL GAS	Unknown
MARDİN-KIZILTEPE (AKSA ENERJİ)	32.10	225.00	225.00	PRIVATE	F.OIL	Unknown
MOSB Enerji Elektrik Üretim Ltd. Şti.(İlave)	43.50	351.86	351.86	PRIVATE	NATURAL GAS	Unknown
NUH ENERJİ EL. ÜRT.A.Ş. (ENERJİ SANT.-2)	119.98	900.00	900.00	PRIVATE	NATURAL GAS	Unknown
ODAŞ DOĞALGAZ KÇS (ODAŞ ELEKTRİK)	54.96	415.00	415.00	PRIVATE	NATURAL GAS	Unknown
POLYPLEX EUROPA POLYESTER FİLM	3.90	31.45	31.45	AUTOPRODUCER	NATURAL GAS	Unknown

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
SAMSUN TEKKEKÖY EN. SAN. (AKSA EN.)	131.34	980.00	980.00	PRIVATE	NATURAL GAS	Unknown
SAMUR HALI A.Ş.	4.30	33.00	33.00	AUTOPRODUCER	NATURAL GAS	Unknown
SARAY HALI A.Ş.	4.29	33.00	33.00	AUTOPRODUCER	NATURAL GAS	Unknown
ŞANLIURFA OSB (RASA ENERJİ ÜR. A.Ş.)	116.76	800.00	800.00	PRIVATE	NATURAL GAS	Unknown
AKSU REG. VE HES (KALEN ENERJİ)	5.20	16.00	12.00	PRIVATE	HYDRO	Unknown
DEĞİRMENDERE (Kadirli) (KA-FNİH ELEK.)	0.50	1.20	0.80	OP.RIGHTS TRANSFER	HYDRO	Unknown
DERME (KAYSERİ VE CİVARI ENERJİ)	4.50	14.00	7.00	OP.RIGHTS TRANSFER	HYDRO	Unknown
ERKEK (KAYSERİ VE CİVARI ENERJİ)	0.32	1.23	0.74	OP.RIGHTS TRANSFER	HYDRO	Unknown
BALKONDU I HES (BTA ELEKTRİK ENERJİ)	9.19	33.00	20.00	PRIVATE	HYDRO	Unknown
BATMAN	0.48	1.16	1.08	PRIVATE	HYDRO	Unknown
GİRLEVİK (BOYDAK ENERJİ)	3.04	21.00	19.00	OP.RIGHTS TRANSFER	HYDRO	Unknown
BERDAN	10.20	47.20	15.00	PRIVATE	HYDRO	Unknown
BOĞUNTU HES (BEYOBASI ENERJİ)	3.80	17.00	10.00	PRIVATE	HYDRO	Unknown
HAKKARİ (Otluca) (NAS ENERJİ A.Ş.)	1.28	6.00	5.00	OP.RIGHTS TRANSFER	HYDRO	Unknown
HASANLAR	9.35	39.90	29.60	GOVERNMENT	HYDRO	Unknown
BÜNYAN (KAYSERİ VE CİVARI EL. T.A.Ş.)	1.16	3.40	3.20	PRIVATE	HYDRO	Unknown
ÇAKIRMAN REG. VE HES (YUSAKA EN.)	6.98	22.00	15.00	PRIVATE	HYDRO	Unknown
İNEGÖL (Cerrah) (KENT SOLAR ELEKTRİK)	0.27	1.00	0.80	OP.RIGHTS TRANSFER	HYDRO	Unknown
İZNİK (Dereköy) (KENT SOLAR ELEKTRİK)	0.24	1.00	0.90	OP.RIGHTS TRANSFER	HYDRO	Unknown
ÇAMARDI (KAYSERİ VE CİVARI EL. T.A.Ş.)	0.07	0.01	0.01	PRIVATE	HYDRO	Unknown
KARAÇAY (Osmaniye) (KA-FNİH ELEKTRİK)	0.40	2.30	2.00	OP.RIGHTS TRANSFER	HYDRO	Unknown
ÇAMLICA III HES (ÇAMLICA ELEKTRİK)	27.62	43.00	25.00	PRIVATE	HYDRO	Unknown
ÇAMLIKAYA REG.VE HES (ÇAMLIKAYA EN)	2.82	6.71	3.88	PRIVATE	HYDRO	Unknown
ÇANAKÇI HES (CAN ENERJİ ENTEGRE)	4.63	19.43	10.96	PRIVATE	HYDRO	Unknown
ÇANAKÇI HES (CAN ENERJİ ENTEGRE)	4.63	19.43	10.96	PRIVATE	HYDRO	Unknown
ÇEŞMEBAŞI REG. VE HES (GİMAK EN.)	8.20	28.00	17.00	PRIVATE	HYDRO	Unknown
KAYADİBİ (BARTIN) (İVME ELEKTROMEK.)	0.46	2.30	2.00	OP.RIGHTS TRANSFER	HYDRO	Unknown
KERNEK (KAYSERİ VE CİVARI ENERJİ)	0.83	0.80	0.60	OP.RIGHTS TRANSFER	HYDRO	Unknown
ÇUKURÇAYI HES (AYDEMİR ELEKTRİK ÜR.)	1.80	8.00	4.00	PRIVATE	HYDRO	Unknown
DAREN HES ELEKTRİK (SEYRANTEPE)	49.70	181.13	140.88	PRIVATE	HYDRO	Unknown
DURU 2 REG. VE HES (DURUCASU ELEK.)	4.49	22.00	13.00	PRIVATE	HYDRO	Unknown
KOVADA-I (BATIÇİM ENERJİ ELEKTRİK)	8.25	4.10	1.60	OP.RIGHTS TRANSFER	HYDRO	Unknown

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
KOVADA-II (BATIÇIM ENERJİ ELEKTRİK)	51.20	36.20	24.40	OP.RIGHTS TRANSFER	HYDRO	Unknown
ERENKÖY REG. VE HES (NEHİR ENERJİ)	21.46	87.00	49.00	PRIVATE	HYDRO	Unknown
EŞEN-1 HES (GÖLTAŞ ENERJİ ELEKTRİK)	30.00	120.00	65.00	PRIVATE	HYDRO	Unknown
EŞEN-1 HES (GÖLTAŞ ENERJİ ELEKTRİK)	30.00	120.00	65.00	PRIVATE	HYDRO	Unknown
GÖKMEN REG. VE HES (SU-GÜCÜ ELEKT.)	2.87	13.00	8.00	PRIVATE	HYDRO	Unknown
KUZUCULU (Dörtöl) (KA-FNİH ELEKTRİK)	0.27	1.30	1.00	OP.RIGHTS TRANSFER	HYDRO	Unknown
M.KEMALPAŞA (Suuçtu) (KENT SOLAR)	0.47	1.50	1.30	OP.RIGHTS TRANSFER	HYDRO	Unknown
MALAZGİRT (MOSTAR ENERJİ ELEKTRİK)	1.22	4.00	3.00	OP.RIGHTS TRANSFER	HYDRO	Unknown
TEKİRDAĞ-ÇORLU TEKS.TES.(NİL ÖRME)	2.68	21.00	21.00	AUTOPRODUCER	NATURAL GAS	Unknown
TİRENDA TİRE ENERJİ ÜRETİM A.Ş.	58.38	410.00	410.00	PRIVATE	NATURAL GAS	Unknown
TOROS TARIM (MERSİN) (NAFTA+D.GAZ)	12.14	96.00	96.00	AUTOPRODUCER	NAPHTA	Unknown
TÜPRAŞ O.A. RAFİNERİ (Kırıkkale) (İlave)	12.00	84.78	84.78	AUTOPRODUCER	NAPHTA	Unknown
YENİ UŞAK ENERJİ ELEKTRİK SANTRALI	8.73	65.00	65.00	PRIVATE	NATURAL GAS	Unknown
ZORLU ENERJİ (B.Karıştıran)	7.20	54.07	54.07	PRIVATE	NATURAL GAS	Unknown
ADİLCEVAZ (MOSTAR ENERJİ ELEKTRİK)	0.39	0.80	0.50	OP.RIGHTS TRANSFER	HYDRO	Unknown
AHLAT (MOSTAR ENERJİ ELEKTRİK)	0.20	0.60	0.50	OP.RIGHTS TRANSFER	HYDRO	Unknown
HACININOĞLU HES (ENERJİ-SA ENERJİ)	71.14	180.00	102.00	PRIVATE	HYDRO	Unknown
HACININOĞLU HES (ENERJİ-SA ENERJİ)	71.14	180.00	102.00	PRIVATE	HYDRO	Unknown
HASANLAR HES (DÜZCE ENERJİ BİRLİĞİ)	4.68	21.00	12.00	PRIVATE	HYDRO	Unknown
İNCİRLİ REG. VE HES (LASKAR ENERJİ)	25.20	126.00	71.00	PRIVATE	HYDRO	Unknown
KARASU 4-3 HES (İDEAL ENERJİ ÜRETİMİ)	4.60	22.00	12.00	PRIVATE	HYDRO	Unknown
KARASU 5 HES (İDEAL ENERJİ ÜRETİMİ)	4.10	24.00	14.00	PRIVATE	HYDRO	Unknown
BAYBURT (BOYDAK ENERJİ)	0.40	1.90	1.70	OP.RIGHTS TRANSFER	HYDRO	Unknown
KARASU 1 HES (İDEAL ENERJİ ÜRETİMİ)	3.84	19.00	11.00	PRIVATE	HYDRO	Unknown
BESNİ KAYSERİ VE CİVARI ENERJİ)	0.27	0.50	0.20	OP.RIGHTS TRANSFER	HYDRO	Unknown
KAZANKAYA REG. VE İNCESU HES (AKSA)	15.00	48.00	27.00	PRIVATE	HYDRO	Unknown
KESME REG. VE HES (KIVANÇ ENERJİ)	2.31	8.02	4.51	PRIVATE	HYDRO	Unknown
KESME REG. VE HES (KIVANÇ ENERJİ)	2.31	8.02	4.51	PRIVATE	HYDRO	Unknown
ÇAĞ-ÇAĞ (NAS ENERJİ A.Ş.)	14.40	25.00	22.00	OP.RIGHTS TRANSFER	HYDRO	Unknown
KIRAN HES (ARSAN ENERJİ A.Ş.)	9.74	41.00	23.00	PRIVATE	HYDRO	Unknown
KORUKÖY HES (AKAR ENERJİ SAN. TİC.)	3.03	22.00	13.00	PRIVATE	HYDRO	Unknown
KÖYOBASI HES (ŞİRİKOĞLU)	1.07	5.00	3.00	PRIVATE	HYDRO	Unknown

Unit Name	Capacity (MW)	Project Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
ELEKTRİK)						
KOZDERE HES (ADO MADENCİLİK ELKT.)	3.15	14.00	8.00	PRIVATE	HYDRO	Unknown
KULP I HES (YILDIZLAR ENERJİ ELK.ÜR.)	22.92	78.00	44.00	PRIVATE	HYDRO	Unknown
ÇEMİŞKEZEK (BOYDAK ENERJİ)	0.12	0.80	0.50	OP.RIGHTS TRANSFER	HYDRO	Unknown
MOLU ENERJİ (Zamanti-Bahçelik HES)	4.17	30.00	30.00	PRIVATE	HYDRO	Unknown
MURATLI REG. VE HES (ARMAHES EL.)	26.70	94.00	55.00	PRIVATE	HYDRO	Unknown
NARINKALE REG. VE HES (EBD ENERJİ)	30.40	108.00	61.00	PRIVATE	HYDRO	Unknown
ÖREN REG. VE HES (ÇELİKLER ELEKTRİK)	6.64	29.00	16.00	PRIVATE	HYDRO	Unknown
OTLUCA II HES (BEYOBASI ENERJİ ÜR.)	6.36	27.00	15.00	PRIVATE	HYDRO	Unknown
PINARBAŞI (KAYSERİ VE CİVARI EL.T.A.Ş.)	0.10	0.40	0.30	OP.RIGHTS TRANSFER	HYDRO	Unknown
POYRAZ HES (YEŞİL ENERJİ ELEKTRİK)	2.66	10.00	6.00	PRIVATE	HYDRO	Unknown
SARAÇBENDİ HES (ÇAMLICA ELEKTRİK)	25.48	101.00	57.00	PRIVATE	HYDRO	Unknown
SARIKAVAK HES (ESER ENERJİ YAT. AŞ.)	8.06	43.00	24.00	PRIVATE	HYDRO	Unknown
SAYAN HES (KAREL ELEKTRİK ÜRETİM)	14.90	47.00	27.00	PRIVATE	HYDRO	Unknown
SEFAKÖY HES (PURE ENERJİ ÜRETİM AŞ.)	33.11	121.00	68.00	PRIVATE	HYDRO	Unknown
SEYRANTEPE HES (Düzeltilme))	7.14	26.02	20.24	PRIVATE	HYDRO	Unknown
SIZIR (KAYSERİ VE CİVARI EL. T.A.Ş.)	5.76	46.00	35.00	OP.RIGHTS TRANSFER	HYDRO	Unknown
SÖĞÜTLÜKAYA (POSOF III) HES	6.13	31.00	18.00	PRIVATE	HYDRO	Unknown
TEFEN HES (AKSU MADENCİLİK SAN.)	11.00	47.00	26.67	PRIVATE	HYDRO	Unknown
TEFEN HES (AKSU MADENCİLİK SAN.)	22.00	94.00	53.33	PRIVATE	HYDRO	Unknown
TURUNÇOVA(Finike) (TURUNÇOVA EN.)	0.55	1.50	0.80	OP.RIGHTS TRANSFER	HYDRO	Unknown
TUZTAŞI HES (GÜRÜZ ELEKTRİK ÜR.)	1.61	10.00	6.00	PRIVATE	HYDRO	Unknown
ULUDERE (NAS ENERJİ A.Ş.)	0.64	3.20	2.60	OP.RIGHTS TRANSFER	HYDRO	Unknown
ÜZÜMLÜ HES (AKGÜN ENERJİ ÜRETİM)	11.36	41.00	23.00	PRIVATE	HYDRO	Unknown
VARTO (MOSTAR ENERJİ ELEKTRİK)	0.29	0.80	0.60	OP.RIGHTS TRANSFER	HYDRO	Unknown
YAMAÇ HES (YAMAÇ ENERJİ ÜRETİM A.Ş.)	5.46	17.00	10.00	PRIVATE	HYDRO	Unknown
YAPRAK II HES (NİSAN ELEKTROMEK.)	5.40	16.00	10.50	PRIVATE	HYDRO	Unknown
YAPRAK II HES (NİSAN ELEKTROMEK.)	5.40	16.00	10.50	PRIVATE	HYDRO	Unknown
YAŞIL HES (YAŞIL ENERJİ ELEKTRİK)	1.52	6.00	3.20	PRIVATE	HYDRO	Unknown
YAŞIL HES (YAŞIL ENERJİ ELEKTRİK)	2.28	9.00	4.80	PRIVATE	HYDRO	Unknown
YEDİGÖL REG. VE HES (YEDİGÖL HİDR.)	21.90	77.00	42.00	PRIVATE	HYDRO	Unknown
YEDİGÖZE HES (YEDİGÖZE ELEK.) (İlave)	155.33	474.83	133.95	PRIVATE	HYDRO	Unknown

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
AYRANCILAR HES (MURADİYE ELEKTRİK)	13.38	53.34	31.16	PRIVATE	HYDRO	Unknown
AYRANCILAR HES (MURADİYE ELEKTRİK)	18.72	74.64	43.73	PRIVATE	HYDRO	Unknown
BAYRAMHACILI BARAJI VE HES	47.00	175.00	95.00	PRIVATE	HYDRO	Unknown
CEVHER I-II REG. VE HES (ÖZCEVHER EN.)	16.36	65.00	32.00	PRIVATE	HYDRO	Unknown
KARASU II HES (İDEAL ENERJİ ÜRETİMİ)	3.08	13.00	8.00	PRIVATE	HYDRO	Unknown
BANDIRMA ENERJİ (BANDIRMA RES)	3.00	10.50	9.50	PRIVATE	WIND	Unknown

**APPENDIX III :THE EIA EXCEMPTION CERTIFICATE OF THE PROJECT
ACTIVITY**

T.C.
ADANA VALİLİĞİ
İl Çevre ve Orman Müdürlüğü
23 Aralık 2010
Sayı : B.18.İÇÖ.01.03/ 586-2793
Konu: ÇED Gerekli Değildir Kararı

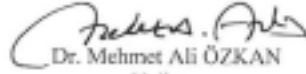
BEREKET ENERJİ ÜRETİM A.Ş.
ADANA.

Toros HES projesi kapsamında, ilimiz Pozantı ilçesi Belededik Köyü ve Karaisalı ilçesi, Karakılıç Köyünde bulunan Bereket Enerji Üretim A.Ş. tarafından açılması planlanan "Beton Santralleri, Kıрма Eleme Tesisleri ve Malzeme Döküm Alanları" için hazırlanan Proje Tanıtım Dosyası, incelenmiş ve değerlendirilmiştir.

ÇED Yönetmeliği'nin 17. maddesi gereğince; "Beton Santralleri, Kıрма Eleme Tesisleri ve Malzeme Döküm Alanları" projesine Valiliğimizce "Çevresel Etki Değerlendirilmesi Gerekli Değildir Kararı" verilmiştir.

Söz konusu faaliyete ilişkin Proje Tanıtım Dosyası ve eklerinde belirtilen hususlar ile 2872 sayılı Çevre Kanunu ve bu Kanuna istinaden yürürlüğe giren ilgili yönetmeliklere uyulması, mer'i mevzuat uyarınca ilgili kurum/kuruluşlardan gerekli izinlerin alınması ve ÇED Yönetmeliğinin 18. maddesi gereğince alınan izin ve ruhsatlar ile yatırımın başlangıç, işletme ve işletme sonrası dönemlerine ilişkin raporların Valiliğimize iletilmesi gerekmektedir.

Bilgilerinizi ve gereğini arz/rica ederim.


Dr. Mehmet Ali ÖZKAN
Vali a.
Vali Yardımcısı

EKLER

- EK 1 : Proje Tanıtım Dosyası, CD Ortamında (1 adet)
EK 2 : ÇED Gerekli Değildir Belgesi.

DAĞITIM

- Çevre ve Orman Bakanlığı (ÇED ve Planlama Genel Müdürlüğüne) (EK 1)
- Bereket Enerji Üretim A.Ş. (EK 2)

T.C.
Çevre ve Orman
Bakanlığı

T.C.
ADANA VALİLİĞİ
İL ÇEVRE VE ORMAN MÜDÜRLÜĞÜ

Karar Tarihi : 18/06/2010
Karar No : 534

ÇEVRESEL ETKİ DEĞERLENDİRME BELGESİ

17 Temmuz 2008 tarih ve 26939 Resmi Gazete’de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği’nin Ek-II listesinde yer alan “Toros HES Projesine ilave Beton Santralleri, Kıрма Eleme Tesisleri ve Malzeme Döküm Alanları” 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.

İlhan ATIS
Vali

Proje Sahibi : Bereket Enerji Üretim A.Ş.
Projenin Yeri : Adana İli, Pozantı İlçesi, Belemelik Köyü (Santral 1), Karaisalı İlçesi Karakılıç Köyü, Yerköprü Mevkii (Santral 2), Karaisalı İlçesi Karakılıç Köyü Malzeme döküm alanı (santral 3)
Kapasite : Beton Santrali 1: 75 m³/gün, Beton Santrali 2: 63 m³/gün, Beton Santrali 3: 63 m³/gün

APPENDIX IV: THE ELECTRICITY GENERATION LICENSE

**T.C.
ENERJİ PİYASASI DÜZENLEME
KURUMU**

EP D.K.

14 EKİM 2008

**T.C.
DENİZLİ 5. NOTERLİĞİ**

ÖRNEKTİR

ÜRETİM LİSANSI **20025**

Bu Lisans kapsamındaki Üretim tesisi
Yenilenebilir Enerji Kaynağı kullanmaktadır.

Lisans No : EÜ/1062-2/782
Tarih : 18/01/2007

Bu lisans, Bereket Enerji Üretim Anonim Şirketi'ne, Adana İli'nde kurulacak olan Toros Hidroelektrik Santrali üretim tesisinde 18/01/2007 tarihinden itibaren 49 yıl süreyle, üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 18/01/2007 tarihli ve 1062-2 sayılı Kararı ile verilmiştir.

**T.C.
Denizli 5. Noterliği
Örnek**

Bu örnek, bir örnek olarak sunulmuştur, bir
örneğin bir örnek olarak sunulmuştur,
T.C.

K.D.V. Harç ve Def. Kağıt Bedeli Vergisi
Dahilinde Ödellenmiş Üçer Alınmıştır

İmza Yetkili
Yeminli Başkan
SİBEL ÖZKAN

Yusuf GÜNAY
Başkan

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

APPENDIX V: THE MAP SHOWING THE RESERVOIR AREA OF THE PROJECT ACTIVITY

