KUMKÖY HYDROELECTRIC POWER PLANT, SAMSUN

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Project Details

1.1 Summary Description of the Project

The proposed project activity is the construction of Kumköy hydroelectric power plant (the "Project Activity"). The Project Activity, located on the Yeşilırmak River in the Black Sea region of Turkey, will generate and supply hydroelectricity to the Turkish National Electricity Grid and will displace electricity produced by fossil fuels. The Project Activity is being developed by Kumköy Enerji Üretim A.Ş. (the "Project Owner") who holds the generation license[1].

The project activity was initially designed by the State Hydraulic Works (Devlet Su İşleri – DSI), as a 10 MW capacity project, later the project owner improved the design and improved the procect capacity to 17. 5MW.

The Kumköy project includes a weir and a reservoir that has been constructed by the General Directorate of State Hydraulic Works (DSI). The weir will serve two purposes: one is to provide water for irrigation and the other is energy generation. The construction of the weir was started by DSI already in 1997, but construction has taken longer to complete than planned due to DSI budgetary problems. The construction of the weir was completed but the irrigation component was in the development phase.

The Kumköy project is planned to irrigate 82,707 hectares of land in the Çarşamba plain downstream of the project. Two water intake structures have been constructed on the right and left hand sides of the Kumköy weir. The overall ammount of water for irrigation purposes will be released through these structures.

The hydroelectric powerhouse and the energy facilities are located next to the weir, as the Project Activity is a river type (run-of-river without a water conveyance system composed of a canal or tunnel) hydropower project. Water released from the weir will be used for power generation exclusively until the irrigation project infrastructure is created in the Çarşamba Plain. After the implementation of the irrigation projects, the Kumköy weir and reservoir will be utilized for both electricity production and irigation purposes. The irrigation project will have a priority for the water and only the remaining amount of water will be utilized to generate electricity.

While most of the Kumköy project infrastructure are to be completed by DSI, the energy facilities including the electromechanical equipment and transmission line have been constructed by the Project Owner.

The Kumköy project is part of the Yeşilırmak Basin Development Plan, which also includes two large-scale energy production projects, the Hasan Uğurlu and Suat Uğurlu dams which are upstream to the Project Activity. The Hasan Uğurlu and Suat Uğurlu dams have been operational for more than 20 years. Kumköy weir is located 2.6 km downstream of Suat Uğurlu dam.

[1] The Energy Market Regulatory Agency (EMRA), granted electricity generation license numbered EÜ/3519-1/2152, on December 1st, 2011.
[2] Kumköy Regülatörü ve HES Projesi, Revize Fizibilite Raporu, Haziran / 2008, Ensu Mühendislik Müsavirlik Ltd. Sti. /The Revised

The Çarşamba plain that will be irrigated by the Kumköy weir is partially under the implementation program of DSI. Some other upstream irrigation projects are planned in the upper catchment area of the Hasan Uğurlu dam. At the moment, there is no definite implementation plan developed by the host country, for these irrigation projects that would impact the generation capabilities of the proposed Project Activity.

To be able to estimate average amount of electricity that will be produced by the project activity, the comprehensive hydrological analysis presented in the third party feasiblity study report[2], on the basis of the overall basin in order to calculate the amount of water available for the weir site. The impact of the development of irrigation projects on the Project Activity has been considered with a rather conservative approach, taking into account the amount of water available for the power plant after the implementation of irrigation projects as shown below (Table1):

Table 1: Table showing the electricity production potential of the project activity over the life span of the project.

Operation Period	Mean Annual Flow (hm^3/year)	Gross Generation (GWh/year)	Net Gen.(Gross x12% losses) (GWh/year)
2011-2020	5 269.3	97.71	85.99
2021-2030	4 711.3	86.21	75.87
2031-2056	4 124.4	72.57	63.86

The implementation of irrigation projects is expected to reduce the amount of water available to the Project Activity only towards the end of the project's first crediting periods onwards (after March-2019). Emission reductions will also be reduced accordingly as the electricity generation of the Project Activity declines.

The projection given in the above table (Table 1) was considered in the revised feasibility report that also makes the basis of the investment decision for the Project Activity. The revised feasibility report of the Project Activity has been officially approved by DSI.

Considering the impact of the irrigation projects, over the 20 years span (that was used as the time span for the financial analysis) the average annual energy generation potential of the project is calculated to be 91,964 MWh.

The environmental impacts of the project will be kept at a minimum level and all the regulations that are in act in the host country, Turkey, will be obeyed during the construction and operation stages of the Kumköy HPP project. At the planning stage these impacts have been investigated and were presented to the Ministry of Environment and Forestry (MoEF now renamed and structured as Ministry of Environment and City Planning), in the form of a Project Introductory File (PIF). The provincial directorate of MoEF in Samsun province examined the report, and the project was granted an EIA not Necessary certification. 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) within the regulator for the downstream and upstream movement of the fish, to facilitate fish migration.

[2] Kumköy Regülatörü ve HES Projesi, Revize Fizibilite Raporu, Haziran / 2008, Ensu Mühendislik Müsavirlik Ltd. Sti. /The Revised (for 17.50 MW) Feasibility Study Report for Kumköy Weir and Hydropower Plant, prepared by Ensu Mühendislik Müsavirlik Ltd. Sti., on June 2008.

The Major milestones at the project development history can be summarized as shown in the following table (Table 2):

Table 2: Major project milestoes

Date	Milestone	Reference
18-Oct-06	Early consideration of Carbon Finance	Correspondence with Energy and Commodity Services GMbH
12-Dec-06	Water Usage Agreement Signed between Kumköy Enerji Üretim A.Ş. and DSI	Agrement
5-Feb-07	Licence acquisition fee paid to the government	Payment receipt
30-Jul-07	EIA not Needed Certificate Issued by MoEF Samsun Province Representation	Certificate in Annex 3
28-Sep-07	Local Stakeholder Consultation Meeting announced in Local (Halk) and National (Türkiye) News papers	News paper clips
3-Oct-07	Local Stakeholder Consultation Meeting held in Çarşamba	Meeting Minutes
25-Jan-08	Turn-Key EPC Contract Signed	EPC Contract Cover page
6-Feb-08	Loan agreement signed	Signature pages of loan agreement
15-Apr-08	Electromechanical Equipment contract signed	E&M Contract
1-Jun-08	Revised Feasibility Report submitted to DSI for approval	FSR Cover page
3-Nov-08	DSI Approval for the revized feasibility study report	DSI Approval letter
9-Oct-09	Contract with DSI to use weir construction facilities	DSI Contract
24-Dec-09	TEIAS Connection Agreement Signed	Agrement
11-Feb-11	System Usage Agreement Signed with Grid Operator	Agrement
23-Feb-11	Government officials approved the project to be suitable to be connected to the grid	Ministry of Energy and Natural Resources approval comittee report
3-Mar-11	First Date Electricity is supplied to the grid	March 2011 PMUM Screen shot
4-Mar-11	Notice letter for readiness to Substantial Complition Sent to Kumköy Enerji Üretim A.Ş. by IC Inşaat (EPC Contractor)	Letter sent to Cenay Elektrik by IC Inşaat
4-Mar-11	Kumkoy Elektrik Ltd.Accepted and issued official Substancial Acceptance Certificate	Substancial Acceptance Certificate
1-Dec-11	Project Licence renewed and issued by EMRA	Project Licence

How the project activity will be operating, and the boundary of the project activity (indicated in broken red line) is outlined in the following figures (Figure 1 and 2).

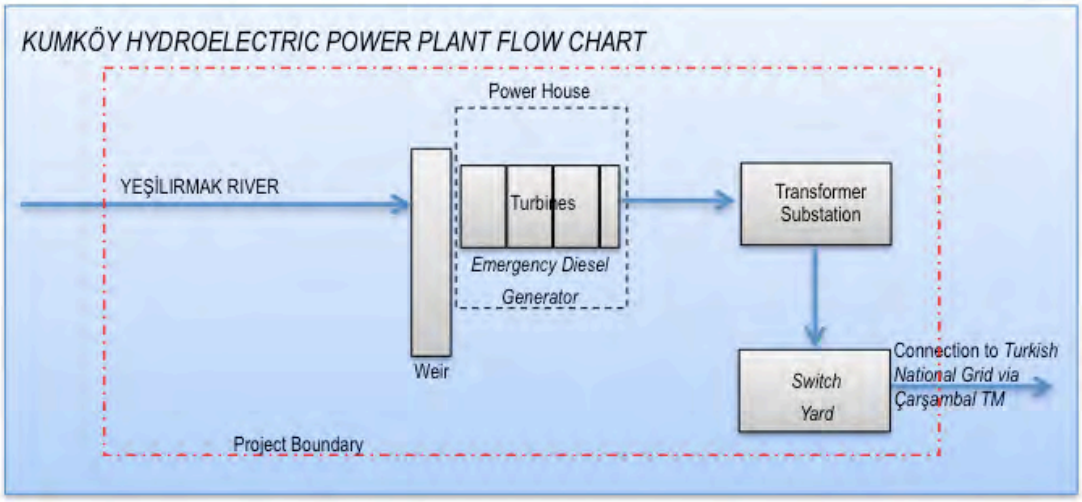


Figure 1: Flow chart showing the basic operational principles of the project activity, and the project boundary.

Figure 2: A picture taken during the construction phase showing the major structures of the project activity.

1.2 Sectoral Scope and Project Type

The project category is Sectoral Scope 1: Energy industries (renewable-/non -renewable sources). The project type is grid connected electricity generation from renewable sources. The project is a non-grouped, stand-alone project.

1.3 Project Proponent

Project Proponent	Role and Responsibility	Contact Information
Kumköy Enerji Üretim A.Ş.	Project Owner – Implementation of the Project	Hacı Halim Mahallesi Yeni Demiryolu Cad. No: 62 41135 Kartepe KOCAELİ Tel: +90 (262) 3171000 Fax:+90 (262) 3171099 e-mail: bora.koprulu@aesentek.com.tr

1.4 Other Entities Involved in the Project

Other Entities Involved	Role and Responsibility	Contact Information
Ekobil Çevre Hizmetleri Dananışmanlık.Eğt.Tar. Hayv.Mad. İnş. İth. İhr.Tur. ve Tic. Ltd. Şti.	Preparation of the Project Description Document	Güneykent Sitesi Ahlatlıbel Mahallesi 1839. Sk. No: 56 Çankaya-ANKARA T:+90 312 489 13 38 E-mail:info@ekobil.com

1.5 Project Start Date

The project start date is March 3, 2011.

1.6 Project Crediting Period

The project crediting period is 10 years: 03.03.2011-02.03.2021 (both days inclusive). The crediting period is renewable twice.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project	Y
Large project	N

Years	Estimated GHG emission reductions or removals (tCO_2e)
Year 0: 03.03.2011 to 31.12.2011	40,842
Year 1: 2012	49,037
Year 2: 2013	49,037
Year 3: 2014	49,037
Year 4: 2015	49,037
Year 5: 2016	49,037
Year 6: 2017	49,037
Year 7: 2018	49,037
Year 8: 2019	49,037
Year 9: 2020	49,037
Year.10: 2021 (01.01.2021 to 02.03.2021)	8,195
Total estimated ERs	490,370
Total number of crediting years	10
Average annual ERs	49,037

1.8 Description of the Project Activity

The Project Activity is a river type (run-of-river project without water conveyance system) hydropower project with a total installed capacity of 17.5 MW and a reservoir total surface area is 597,000 m^2. The estimated annual stream flow in the Project Activity is 5,269.3 million m^3. The design discharge flow of the project is 210 m^3/s. (These numbers have been approved by DSI). The project discharge flow would run through a 9.41 m Net head (Gross head – 9.76 m) to generate annually 45.991 GWh of firm energy and 51.722 GWh of secondary energy with a total gross annual estimated energy of 97.713 GWh. Taking into account the generation losses due to the development of the irrigation projects the project is calculated to produce 91, 964 MWh of electricity over the next 20 year of the project lifespan.

Related with the electromechanical equipment of the Project Activity, a contract, “The Supply and Installation of Electro-Mechanical Equipment for Kumköy Hydro-Electric Power Plant” has been signed with Harbin Electric (HE) Corporation.

The Bulb type turbines, which are the most efficient type for the project’s specific characteristics have been designed and produced by this company according to the aforementioned supply agreement.

Since the scope of Kumköy reservoir is expected to provide irrigation water from the Yeşilırmak River to the nearby Çarşamba plain (downstream from the project), the future annual average flow of the Project Activity is predicted to decline once the irrigation projects are developed. Net energy generation of the Project Activity is expected to drop to 75.868 GWh/year for the in-process irrigation plan (2020) and to 63.860 GWh/year with the complete development of the irrigation facilities (2030). This situation is shown below in numbers.

Table 3: Table showing the electricity production potential of the project activity over the life span of the project.

Operation Period	Mean Annual Flow (hm^3/year)	Gross Generation (GWh/year)	Net Gen Gross x12% losses) (GWh/year)
2011-2020	5,269.3	97.71	85.99
2021-2030	4,711.3	86.21	75.87
2031-2056	4 ,24.4	72.57	63.86

According to these figures, an energy yield reduction is expected only at the last years of the first crediting period (2011-2021). The only exceptional cases would be at the time of river over flooding. In these specific events, surplus water would be diverted to dedicated accumulation reservoirs or would be released downstream through special flood control gates.

The Project Activity will be environmentally safe since it simply uses the water instead of any fossil fuel to produce electricity and it does not contaminate the water and environment. Furthermore there is no conveyance canal/tunnel to divert water for energy purpose in this Project Activity. The scope of the Project Activity is also composed of mainly installation of electromechanical equipment by using the existing structure. This is why; the Project Activity will not cause any negative impact to the environment.

The Kumköy project would be comprised of the following main parts:

- A weir with 135 m crest length, 14 m height (constructed by DSI)
- Spillway equipped with 12 radial gates for flood control (constructed by DSI)
- 2 water intake structures dedicated for irrigation water diversion purpose (under construction by DSI)
- Dedicated radial gates to the HEPP in order to allow water inlet to the power house (constructed by DSI).
- Powerhouse– a 35 x 20 x 25 m dedicated construction where the turbines and generators will be placed (constructed by DSI).
- One specially designed fish ladders in order to allow the fish to swim upstream and over the dam (constructed by DSI).
- 3 “Bulb” turbines. For a 9.41 m of net head (Gross head – 9.76 m) these turbines are considered as the state of the art technology. Each turbine will have 70 m^3/s of design discharge (installed by the Project Owner).
- 3 Generators each with 6.55 MVA powers that would be placed on the top of each turbine. (installed by the Project Owner)
- Transmission line- power will be transmitted to the national grid by approx. 1,2 km 1x477 MCM, 31,5 kV transmission lines to the Çarşamba Transformer Substation (constructed by the Project Owner).

The Project Activity's main technical characteristics obtained from the Project's final feasibility report are provided below (Table 4):

Table 4: Major characteristics of the project activity

Component	Property
Thalweg elevation of the weir	:18 m
Crest elevation of the weir	:32 m
Weir height	:14 m
Spillway capacity	:1 710 m^3/s
Max. operation level	:30 m
Min. operation level	:28 m
Project design capacity	:210 m^3/s
Max. flow	:685 m^3/s
Minimum flow	:22 m^3/s
Average flow	:167 m^3/s
Gross head	:9.76 m
Net-head	:9.41 m
Turbine type	:Bulb
Installed capacity	: 17.50 MW_e
Number of units	:3
Capacity of each unit	:70 m^3/s
Max. power capacity of each unit	: 6.073 MW_m
Total max. turbine capacity	: 18.22 MW_m

The project activity will be producing electricity using bulb type turbines. The following drawing (Figure 3), provides a schematic representation of how the turbines of the project will operate.

Figure 3: A representative drawing that exhibits how a bulb type Kaplan Turbine works.

1.9 Project Location

The Project Activity is located between 41º05'40"- 41º05'50" north and between 36º41'10"-36º41'25" east on the Yeşilırmak river in Samsun Province at the Black Sea Region northern part of Turkey. The Project Activity is approximately 50 km from the city of Samsun and about 10 km from the town of Çarsamba (Figure 5). The nearest settlements are the villages of Kumköy, Kurtahmetli and Kemer. The coordinates of the major project components are given in the following table (Table 5).

Table 5: The location of the major project components

Structure	Latitude	Longitude
Weir	41° 7'12.77"N	36°43'9.34"E
Powerhouse	41° 7'15.34"N	36°43'4.76"E

Figure 4: The location of the project at the Google Earth sattalite image

1.10 Conditions Prior to Project Initiation

There was no other hydroelectric power plant installation at the project location. The project activity does not generate greenhouse gas emissions, so it can be excluded that the implementation has been made only in order to generate GHG emissions with their subsequent reduction.

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 additions are in compliance 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 Annex 1.

1.12 Ownership and Other Programs

1.12.1 Right of Use

Ownership of the plant, equipment and electricity generation licence belongs to Kumköy 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

The Project Activity is not embedded under any kind of Emission trading programs. Turkey is not an Annex-B country under Kyoto Protocol, neither has its set national emission reduction targets nor any related obligations.

1.12.3 Participation under Other GHG Programs

Not applicable

The project is a voluntary project and the host country, Turkey cannot host CDM or JI projects. The project has not been registered under any other voluntary GHG program.

1.12.4 Other Forms of Environmental Credit

Not applicable

The project will not generate other form of environmental credits such as Green Power Certificates.

1.12.5 Projects Rejected by Other GHG Programs

Not applicable

The project has not been rejected by any other Green House Gas programme.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The Project is eligible to be a VCS Project because:

- VCS v.3.3 has taken effect on 04.10.2012, accordingly the Project is eligible to use this version.

- VCS v.3.3 requires project crediting period start date earliest to be 01.01.2002, besides, the Project must also complete the validation within two years of the Project Start Date, which is 03.March 2011. Both conditions are satisfied for the Project activity.

- VCS v.3.3 accepts all six Kyoto Protocol gases. The Project aims to reduce CO_2, which is one of these six Kyoto Protocol gases.

- VCS v.3.3 accepts all technologies supported by a VCS approved GHG program. The Project is a hydropower plant, the technology of which is included in the UNFCCC- CDM sectoral scope 1.

- VCS v.3.3 requires the use of one of the VCS program approved project methodologies. The Project activity uses the tools and methodologies of approved by UNFCCC CDM executive board, which is a VCS approved program.

- The project does not benefit from any kind of Official Development Assistance.

- In addition to the above, the project is not a grouped project activity, nor de-bundled part of a grouped project activity

Leakage Management

Not Applicable as the project is a green field project.

Commercially Sensitive Information

A detailed Excel workbook summarizing the financial analysis is provided to the validating DOE with relevant evidences that are commercially sensitive, these will not be disclosed to public.

Further Information

No further information to be added.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The following UNFFCC 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 13.0.0.

The Approved Methodology refers to the following tools:

“Tool for the demonstration and assessment of additionality” (Version 07.0.0; EB 70 -Annex 8)

“Tool to calculate the emission factor for an electricity system”. (Version 03.0.0;EB 70-Annex 22)

"Guidelines on the assessment of investment analysis” (Version 5; EB62-Annex5)

2.2 Applicability of Methodology

The ACM0002 (version 13.0.0) 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 13.0.0, is justified as the project activity meets the following applicability criteria:

Reference page in ACM0002 (version 13.0.0)	**Applicability Criteria**	**Justification**
2	The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	The project 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)
3	• In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on	Not applicable as the project is not a capacity addition

<table>
<tr><td></td><td>page 10 to calculate the parameter EGPJ,y): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.</td><td></td></tr>
<tr><td>3</td><td colspan="2">In case of hydro power plants, one of the following conditions must apply:</td></tr>
<tr><td>3</td><td>The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or</td><td>Not Applicable as the project activity is the addtion of a new hydro power plant thus a new reservoir.</td></tr>
<tr><td>3</td><td>The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m2; or</td><td>Not Applicable as the project activity is the addtion of a new hydro power plant thus a new reservoir.</td></tr>
<tr><td>3</td><td>The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m2; or</td><td>Not Applicable as the project activity is the addtion of a new hydro power plant thus a new reservoir.</td></tr>
<tr><td>3</td><td>The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m^2.</td><td>The project activity results in new reservoirs and the power density of the project activity is 29.31 W/m^2 which is greater than 4 W/m^2 as shown in the following calculation:
<table>
<tr><th>Project Activity</th><th>Installed Capacity</th><th>/</th><th>Reservoir Area[3]</th><th>=</th><th>Power Density</th></tr>
<tr><td>Kumköy HPP</td><td>17,500,000 W</td><td>/</td><td>597,000 m^2</td><td>=</td><td>29.31 W/m^2</td></tr>
</table></td></tr>
<tr><td>3</td><td>In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m^2 all the following conditions must apply:
The power density calculated for the entire project activity using equation 5 is greater than 4 W/m^2;</td><td>Not Applicable as the project activity is going to result in only one single reservoir.</td></tr>
</table>

[3] The reservoir volume Area curve that indicates the aerial extent of the reservoir at maximum operation level is provided in Annex 5.

	Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project[4] that collectively constitute the generation capacity of the combined power plant; Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m^2, is lower than 15 MW; Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m^2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.	
4	The methodology is not applicable to the following: 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; Biomass fired power plants; A hydro power plant[5] that results in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4 W/m^2.	The project activity is elligible because: • It is not involving switching from fossil fuel at the site of the project activity, • It is not a biomass powered power plant • Project activity is resulting in the creation of a new reservoir but the power density is not less than 4 W/m^2. But instead it is greater than 4 W/m^2.
c4	In the case of retrofits, replacements, or capacity additions, the ACM0002 (version 13.0.0) methodology is only applicable if the most plausible baseline scenario, as a result of the	Not applicable as the project activity is the installation of a new hydro power plant and all the equipment that will be installed wil be brand new.

[4] This requirement can be demonstrated, for example: (i) by the fact that water flow from upstream power units spilling directly to the downstream reservoir; or (ii) through the analysis of the water balance. Water balance is the mass balance of water fed to power units, with all possible combinations of multiple reservoirs and without the construction of reservoirs. The purpose of such water balance is to demonstrate the requirement of specific combination of multiple 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 three years prior to implementation of CDM project activity.

[5] The ACM002 (version 13.0.0) indicates that "…project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology".. ;In the case of the project activity as the power density is greater than 4 W/m^2, there is no need for such a claim or revision request. .

	identification of baseline scenario, is "the continuation of the current situation, i.e. 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".	
Footnote 3 pg.4	The condition in the "Combined tool to identify the baseline scenario and demonstrate additionalityî that all potential alternative scenarios to the proposed project activity must be available options to project participants"does not apply to this methodology, as this methodology only refers to some steps of this tool.	

2.3 Project Boundary

Table 6 exhibits the gases included in the project boundary. CO_2 emission is included in the baseline but the project activity does not emit any of the gases listed, in Table 6.

The project boundary includes net electricity generated and supplied to the Turkish national grid.

Table 6: 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_2O	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_2O	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 13.0.0):

"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 (v.03.0.0; EB 70-Annex 22)."

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 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, 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 (EFy) 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 70, Annex 8.

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, 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 Annex 1.

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 or financially attractive" option*. Please note that, at this step, the "Guidelines on the assessment of investment analysis" (EB 62 Report Annex 5) Version 05 is followed.

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 economic 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 7.0.0 (EB 70, Annex 8) and the Guidelines issued at EB 62 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 62[6], provides the default values for the expected return on equity as an appendix, and Moody's index values of most of the CDM Countries. At the time of investment decision, Turkey's Moody's index (Ba2) was comparable to country's with the same Moody's index, and same default benchmark value from this point of view a reasonable and appropriate benchmark to compare the Equity IRR can be taken as 12.50 %.

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 "KumkoyFinancialAnalysis" workbook and submitted to the validating DOE.

Table 7: Major parameters taken into account for the financial analysis and determination of the Equity IRR of the Kumköy HPP Project:

Parameter	Value	Unit	References
Installed Capacity	17.50	MWe	Electricity Generation License of the project activity.
Expected Annual Electricity Generation	91,964	MWh	Revised Feasibility Report
Expected Average Annual Emission Reduction (ER)	49,037	tCO_2e	Calculated (see Chapter 3 for details) based on the electricity production values.
Total Investment	55,820,378	USD	EPC contract
Annual Operation Costs	706,338.22	USD	Based on FSR (Table 9.2, maintenance & spare parts), EIA report (staff & labour).
Loan	Confidential	USD	Loan Agreement
Loan Period	7	years	Loan Agreement
Electricity Sales Price	0.0913	USD/KWh	This is a calculated weigthed average price, based on the price expectations of project owner (over the 20 years of financial analysis period) explained in chapter 9, of the FSR.
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, 75 % of the long lasting assets are depreciated over 45 years and the residual book value of 22,946,390.63 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, based on the experts' committee report[7] on energy 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 years[8]. As a result the project lifetime is estimated to be about 20 years and the investment analysis is therefore done for a time frame of 20 years.

[6] Annex 5 Guidelines on The Assessment of Investment Analysis (Version 05)
[7] http://ekutup.dpt.gov.tr/enerji/oik585.pdf page 4.25 (Last visited on 3/3/2011)
[8] http://ekutup.dpt.gov.tr/enerji/oik585.pdf page 4.26 (Last visited on 3/3/2011)

For the assessment of the viability of the project activity the Equity IRR is compared to the benchmark. The equity IRR is worked out as 8.87 %, which is below the benchmark of 12.50%.

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 affect 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 ±10% fluctuations in the above parameters. The figures in the following table (Table 8) 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 7).

Table 8: Sensitivity analysis for the Equity IRR without carbon revenue for the project (Benchmark: 12.50%)

Change	-10%	-5%	5%	10%	Exceed Benchmark?
Investment Cost	10.5%	9.6%	8.2%	7.6%	No
Operating Cost	9.0%	8.9%	8.8%	8.8%	No
Electricity Revenue	8.1%	8.5%	9.2%	9.6%	No

Figure 5: 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 48.40 % over the life of the project, or the investment cost must be reduced by about 19.00 %. As the Renewable energy law only guaranties a minimum price of USD 0.073 per kWh, the unit price we have utilized in our financial analysis is very conservative and we do not expect an increase in the electricity revenue related to a price increase and since the feasibility report and the design of the project is based on the maximum available capacity of the Yeşilırmak river, and all our financial analysis is based on the maximum electricity output of the project, such an increase based on the increased amount of electricity generation is very unlikely. In addition to that as the availability of the water decreases due to the globally accepted results of global climate change, electricity production is very unlikely to reach to an increased generation amount of an additional 48.40%. In addition to this the climate change models indicate for the Mediterranean basin an increased drought and water scarcity that could even risk the project to reach the firm energy values.

The investment costs we have considered in our financial analysis was based on the numbers presented to the bank when the project developer was negotiating the terms of the bank loan.

Therefore these numbers reasonable and reflect the average market conditions but are unlikely to go down, as the focus of the project developer is to secure and improve the electricity yield and therefore they will not be able to cut costs. Therefore it is very unlikely for the investment cost to finalize below the amounts estimated and shown in the financial analysis.

Outcome of Step 2:

Without the VER revenue the Internal Rate of Return of the project cannot get close to the benchmark of 12.50 %, with an equity internal rate of return of 8.87%. A fluctuation of ± 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 Kumköy HPP.

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. Although the tool does not consider the Sectoral Scope 1: Energy industries (renewable-/non -renewable sources) projects amongst the measures that can make use of the common practice guideline version 02, we preferred to utilise the same guideline to demonstrate that within the boundaries of the Yeşilırmak catchment there are no similar projects that are developed and operational without the assistance of the VER revenue. According to the Guidelines on Common Practice (version 02), common practice analysis is presented through the following 4 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 17.50 MW of the proposed project is selected as the design capacity. Therefore, the range from 8.75 MW to 26.25 is considered as applicable capacity.

Outcome of Step 2: Applicable output range is 8.75 MW to 26.25.

Common Practice tool Step 2: identify similar projects (both CDM and non-CDM) which fulfil 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[9].

The host country is geographically divided into 25 catchements as shown in the following figure (Figure 6). As can be seen from the figure the project site is located within the borders of the Yeşilırmak Catchment. Yeşilırmak and its major tributary Kelkit River constitute the Yeşilırmak River Catchment. Therefore we have considered the geographical boundry of our common practice analysis as the Yeşilırmak Catchment, and we have checked the hydropower plants that are operational and located on the Kelkit and Yeşilırmak Rivers. These are listed on Table 9:

Figure 6: The 25 Water Catchements defined in Turkey.[10]

[9] While identifying similar projects, project participants may also use publicly available information, for example from government departments, industry associations, international associations on the market penetration of different technologies, etc.

[10] Source: The longterm Catchment Management Plans of Turkey. http://www.google.com.tr/url?sa=t&rct=j&q=su%20havzalari%20haritasi&source=web&cd=3&ved=0CD4QFjAC&url=http%3A%2F%2Fwww.ormansu.gov.tr%2Fosb%2FLibraries%2FDok%25C3%25BCmanlar%2FUHYS.sflb.ashx&ei=QvouUa-qJunJ0QWR7ICYBg&usg=AFQjCNHKcm_cvp8c0e22N1f72EUci81Hsg&bvm=bv.43148975,d.d2kiv

Table 9: Power Plants that are operaional on Yeşilırmak and Kelkit Rivers as of 11 April 2012 (as announced by the DSI as an answer to a question asked by a parliament member in the Turkish National Assembly).

Name of the Power Unit	Ownership	Capacity (MW)	Mean Production (GWh)	Firm Production (GWh)	Province	Town
Yavuz HES[11]	Private	22.5	83.0	47.0	Amasya	Tasova
Taşova-Yenıdereköy	Private	2	10.0	6.0	Amasya	Tasova
Kumköy (Project Activity)	Private	17,5	98.0	55.0	Samsun	Çarşamba
Kılıçkaya	Government	120	332.0	277.0	Sivas	Su Şehri
Çamligöze	Government	32	102.0	68.0	Sivas	Su Şehri
Koyulhisar [12]	Private	42	329.0	155.0	Sivas	Koyulhisar
Reşadiye [13]	Private	64.28		400.3	Sivas	Reşadiye
Almus Dam	Government	27	99.0	39.0	Tokat	Almus
Ataköy Dam	Government	5.5	8.0	8.0	Tokat	Niksar
Hasan Uğurlu	Government	500	1217.0	820.0	Samsun	Çarşamba
Suat Uğurlu	Government	69	350.0	250.0	Samsun	Çarşamba
Köklüce	Government	90	588.0	300.0	Tokat	Niksar

Outcome of Step 2:

Only Yavuz HPP is identified as a comparable project.

Step 3: 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}.

The above list covers all the power plants within the geographical boundary defined above (as Yeşilırmak River Catchement). Checking all the power plants within the capacity range determined in Step 1, and looking projects that have started commercial operation before the start date of the project, it is revealed that there are no power plants operational in the Yeşılırmak Catchement comparable to project activity except Yavuz HPP (Determent in Step 2), which is a registered GS VER Project. . Therefore the number of N_{all} is 0.

$N_{all}=0$

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}.

When we consider the project listed in Step 3 as, N_{all} is zero there is no project that can be compared to Kumkoy HPP so the N_{diff} is also zero.

[11] Registered as a Gold Standard Hydroelectric Project with GS 651 registration number.
[12] VER Registered as VCS 713
[13] VER project registered as GS 643, 644 and 645 in 3 components.

Outcome of Common Practice tool Step 4 is N_{diff}=0

Common Practice tool Step 5: Step 5: calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

$F=1-N_{diff}/N_{all}$

F=1-(0/0)

F=0

Conclusion of Common Practice tool version 2.0 (EB 69 Report Annex 8):

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 < 0.2

N_{all}-N_{diff} =0-0=0 <3 in that case the Kumköy HPP is not common practice.

Conclusion: In conclusion the proposed project is deemed to be additional according to ACM0002 and the tool and guideline for the demonstration and assessment of additionality.

2.6 Methodology Deviations

The UNFCCC methodology of ACM0002/ Version 13.0.0 and its related tools have been applied without any deviations.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

According to the latest version (version 13.0.0) 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 03.0.0 (*EB 70, Annex 22*)).*

The Project therefore applies the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" (version 03.0.0 (EB 70, Annex 22)).

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:

1. *"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.

2. *"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):

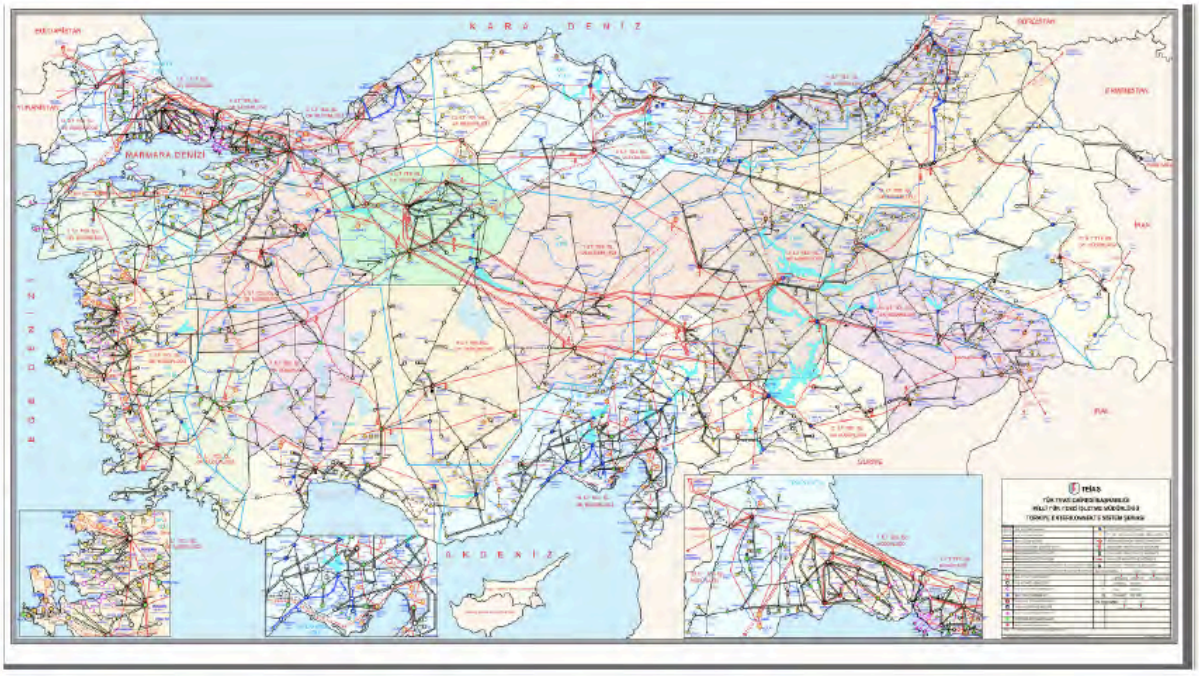


Figure 7: The Map showing the boundaries of Turkish Electricity Grid (Source Electricity Market Report 2010, by Electricity Market Regulatory Authority http://www.epdk.gov.tr/documents/10157/48dd12d4-74da-4dcf-9f48-86983146c0d8)

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:

(a) 0 t CO2/MWh; or

(b) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.1, 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 section 6.4.2 below; or

(d) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 section 6.4.4 below.

For imports from connected electricity systems located in Annex I country(ies), the emission factor is 0 tons CO_2 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

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 power plants 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 an operating margin (OM) method

According to the "Tool to calculate the emission factor for an electricity system", version 03.0.0 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 10), therefore, in accordance with the Tool, (a) Simple OM method will be used in the calculations.

Table 10: **Share of primary sources in electricity generation, 2007 – 2011**[14]

	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 (tCO_2/GWh), and averaged over the

[14] Annual Development of Installed Capacity Generation in Turkey (1970-2011)
http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/kgucunkullanım(13-21)/13.xls
(http://www.teias.gov.tr/istatistik2010/front%20page%202010-çiçek%20kitap/kgucunkullanım(13-21)/13.xls)

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

The Simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit of net electricity generation (tCO_2/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 CO_2 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 type[15],

- Annual heating values for fuels consumed for electricity generation[16],

- Annual electricity generation by fuel type, import and export[17]

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

[15] Fuel Consumed in thermal P.P.in Turkey by the Electric Utilities (2006-2011) (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakıt46-49/47.xls)
[16] Heating Values Of Fuels Consumed In Thermal P.Ps In Turkey By The Electric Utilities (2006-2011), (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakıt46-49/49.xls).
[17] Annual Development of Turkey's Gross Electricity Generation by Primary Energy Resources and The Electricity Utilities (2006-2011)) / (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim(22-45)/40(06-11).xls)/ Annual Development of Electricity Generation-Consumption and Losses in Turkey (1984-2011), (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls)

plant / unit and a CO_2 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:

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})}{EG_{y,grid}} \quad (7)$$

Where:

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

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

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

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)

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

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

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

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 ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, 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 ($AEG_{SET\text{-}\geq 20\%}$, in MWh);

c) From $SET_{5\text{-units}}$ 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 (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$\mathrm{EF}_{grid,BM,y} = \frac{\sum_m \mathrm{EG}_{m,y} \times \mathrm{EG}_{EL.m.y}}{\sum_m \mathrm{EG}_{m,y}}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO2 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 CO_2 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 $EF_{EL,m,y}$.

The CO_2 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 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 CO_2 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 2010 and 2011, 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 - Calculation of the combined margin emissions 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_{OM} and EF_{BM} 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* (tCO_2/yr)
$EG_{PJ'y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emissions factor in year *y* (tCO_2/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:

$$ER_y = BE_y - PE_y$$

Where:

ER_y	=	Emission reductions in year *y* (tCO_2)
BE_y	=	Baseline emissions in year *y* (tCO_2)
$PE_{,y}$	=	Project Emissions in year *y* (tCO_2)

As methodology states the PEy in case of a hydro power project with a power density > 10 W/m^2 (that is 29.31 W/m^2 for the Project Activity) to be zero hence ERy = BEy

3.2 Project Emissions

As the methodology states the PEy 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 CH_4 and CO_2 emissions from the reservoir, estimated as follows:"

"...the power density of the project activity (PD) is greater than 4 W/m^2 and less than or equal to 10 W/m^2:"

Capacity (W)	/	Reservoir Area (m^2)	=	Power Density (W/m^2)	>10 (W/m^2)
17,500,000	/	597,000	=	29.31	>10 (W/m^2)

The project has a power density of 29.31 W/m^2 therefore

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

Where:

$PE_{HP,y}$ Project emissions from water reservoirs (tCO_2e/yr)

Although there will be an emergency/back up diesel generator installed within the project boundary, the emissions from these have been deemed negligible as per the ACM0002 (version 13.0.0) methodology, since it will be solely utilized in case of an emergency, such as a power outage.

3.3 Leakage

There are no leakage emissions related to project activity.

3.4 Summary of 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 PD 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 11).

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/kt as follows:

Table 11: 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	43.09	43.15
LPG	46.47	0.00[13]	0
Naphtha	43.65	33.50	0
Natural Gas	37.17	37.38	37.10

The emission factors of fuels required are taken from IPCC 2006 guidelines for GHG inventories[18]. All data used for the calculations can be found in Annex-2 (See Table 1 and Table 2 to in Annex -2). Table 12 shows total CO_2 emission by fuel types calculated using lower IPCC emission factors and available data from the TEİAŞ website.

Table 12: Calculation of emission by electricity generation (2008-2011)

	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
Naphtha	24,429.94	30,502.68	0.00
Natural Gas	42,346,272.06	44,215,362.69	0.00
TOTAL	98,532,814.60	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 13.

Table 13: 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	1,143.80	4,555.80
***EG_y* (GWh)**	151,135.43	150,949.83	167,337.11
***EG_y* (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 CO_2 emissions for those years (Table10) to the Net Electricity Generation (Table 13) for the subject year. The annual OM emission factors are calculated as follows (Table 14):

[18] 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-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf)

Table 14: Annual OM Emission Factors

Year	OM Emission Factor
2009	0.65195
2010	0.65670
2011	.66227

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

$EF_{grid,OMsimple}$ =0.65716

Build Margin (BM)

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 ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, 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 ($AEG_{SET\text{-}\geq 20\%}$, in MWh);

c) From $SET_{5\text{-units}}$ 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 TEIAŞ didn't anounce 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 $SET_{5\text{-units}}$.

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 TEIAŞ web site (www.teias.gov.tr) , the net generation in year 2011 was 217,557.7GWh (See Table 13 in 2011, out of this amount 9,646.71 GWh was identified[19] to be

[19] A list of units providing electricty to the year 2011 Turkish Electricity Grid is provided as an Annex 1 to the most recent Capacity Projection report published by TEIAS (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

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 $AEG_{SET\text{-}5\text{-}units}$ 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 $AEG_{SET\text{-}5\text{-}units}$.

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.

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 41,582198 GWh. Therefore, to reach the AEG_{SE} 20% all the units added in year 2010 are also aded. 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 TEIAS 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 2011[20] and 2010[21] 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 Table8b).

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

(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.

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

[21] http://www.teias.gov.tr/projeksiyon/KapasiteProjeksiyonu2011.doc

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 03.0.0) (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 46%. 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 15):

Table 15: Default Electric efficiency rates taken from Annex 1 of the Methodological Tool to calculate the emission factor for an electricity system (Version 03.0.0) (EB 70 Report Annex 22).

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 parameters for the calculation of $EF_{EL,m,y}$, and its calculation is shown in Table 16 below:

Table 16: Calculation of EF_{EL} generation efficiency based on the default values provided in Annex 1 of the Methodological Tool to calculate the emission factor for an electricity system (Version 3.0.0) (EB 70 Report Annex 22)

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
Naphta	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 CO_2 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 17). The emission factor has been taken as "zero" for the renewable and wastes. The Build Margin Emission Factor for each year is calculated by dividing the total CO_2 Emissions of the subject year by the total generation from the capacity additions of the same year.

Table 17 Annual CO_2 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	
Naphta	-	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:

$EF_{grid,BM}$ = 0.40930 tCO_{2e}/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 tCO_{2e}/MWh + 0.50 * 0.40930 tCO_{2e}/MWh = 0.53323 tCO_{2e}/MWh

Emission reductions

$ER_y = BEy = EG_{facility,y} * EFy$

= 91,963.5 MWh* 0.53323 tCO_{2e}/MWh = 49,037 tCO_{2e} for each year.

A summary of the GHG removals by the project activity is given as follows (Table 18):

Table 18: summary of the GHG removals by the project activity

Years	Estimated baseline emissions or removals (tCO_{2e})	Estimated project emissions or removals (tCO_{2e})	Estimated leakage emissions (tCO_{2e})	Estimated net GHG emission reductions or removals (tCO_{2e})
Year 0: 2011 (March3rd to Dec. 31st)	40,842	0	0	40,842
Year 1: 2012	49,037	0	0	49,037
Year 2: 2013	49,037	0	0	49,037
Year 3: 2014	49,037	0	0	49,037
Year 4: 2015	49,037	0	0	49,037
Year 5: 2016	49,037	0	0	49,037
Year 6: 2017	49,037	0	0	49,037
Year 7: 2018	49,037	0	0	49,037
Year 8: 2019	49,037	0	0	49,037
Year 9: 2020	49,037	0	0	49,037
Year 10: 2021 (Jan. 1st to March 2nd)	8,195	0	0	8,195
Total	490,370	0	0	490,370

4 MONITORING

4.1 Data and Parameters Available at Validation

The following are the data and parameters available at validation:

Data / Parameter:	$FC_{i,y}$
Data unit:	Volume Unit (cubic meter)
Description:	Amount of fuel *i* consumed by relevant power plants in Turkey in years, 2009, 2010, 2011.
Source of data:	Official publications at the Turkish Electricity Transmission Company (TEIAŞ) Web Site (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakıt46-49/47.xls)
Measurement procedures (if any):	-
Monitoring frequency:	Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation
Value applied:	Please see Annex 2-Table-1
QA/QC Procedures	-

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.
Any comment:	Data used for the calculation of $EF_{grid,OM,Simple,y}$

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/Mass or Volume Unit
Description:	Net Calorific Values for fossil fuel type *i* in year*, for the years* 2009, 2010 and 2011
Source of data:	Regional or national average default values that are reliable and documented in national energy statistics of the Turkish Electricity Transmission Company Web Site (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakıt46-49/49.xls http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakıt46-49/47.xls)
Measurement procedures (if any):	-
Monitoring frequency:	For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation For BM: For the first crediting period, once for the *ex ante* and for the second and third crediting period, only once *ex ante* at the start of the second crediting period
Value applied:	Please see Annex-2-Table-5
QA/QC Procedures	-
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.
Any comment:	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.

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* in year *y*
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
Measurement procedures (if any):	-
Monitoring frequency:	For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation For BM: For the first crediting period, once for the *ex ante* and for the second and third crediting period, only once *ex ante* at the start of the second crediting period
QA/QC Procedures	-

Value applied:	Please see Annex 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 03.0.0 , 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.
Any comment:	Data used both for the calculation of $EF_{grid,OM,Simple,y}$ and $EF_{EL,m,y}$

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity generated in the project electricity system in other words, 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
Source of data:	Turkish Electricity Transmission Company Web Site http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls
Measurement procedures (if any):	-
Monitoring frequency:	For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation For BM: For the first crediting period, once for the *ex ante* and for the second and third crediting period, only once *ex ante* at the start of the second crediting period
QA/QC Procedures	-
Value applied:	Please see Annex 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.
Any comment:	Data used for the calculation of $EF_{grid,OM,Simple,y}$

Data / Parameter:	$EG_{m,y}$
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by power unit m in year y
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[22] and 2012[23].
Measurement procedures (if any):	-
Monitoring frequency:	For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation For BM: For the first crediting period, once for the *ex ante* and for the second and third crediting period, only once *ex ante* at the start of the second crediting period
QA/QC Procedures	-
Value applied:	Please see Annex 2-Table 8.
Justification of choice of data or description of measurement	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The

[22] http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf
[23] http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf

methods and procedures applied:	data published on the TEİAŞ website is the most up-to-date and reliable data available for the Turkish grid.
Any comment:	Data used for the calculation of $EF_{grid,BM,y}$

Data / 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 03.0.0)" are used
Measurement procedures (if any):	
Monitoring frequency:	Once for the crediting period
QA/QC Procedures	N/A as the default values provided in Annex 1 are used.
Value applied:	Please see Annex 1 of the "Tool to calculate emission factor for an electricity sector (Version 03.0.0)"
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.
Any comment:	Data used for the calculation of EFgrid,BM,y

4.2 Data and Parameters Monitored

Data / Parameter:	$EG_{PP\text{-}self\ consumption,\ y}$
Data unit:	MWh
Description:	Quantity of electricity imported by the power plant from the Grid for self consumption, in year y
Measured /Calculated /Default:	Measured
Source of data:	The Primary source of data will be the Main TEIAS meter readings recorded at the monthly reading protocols, the column related to electricity obtained from the Grid. The secondary source of data will be the PMUM/MFRC web site screen shots, the column with the heading UECM[24].
Description of measurement methods and procedures to be applied:	Measurements are to be made by electricity meters that belong to the grid operator, TEIAŞ. The meters will be in compliance with the collected data. Data will be used to calculate the net electricity supplied to the grid,
Frequency of monitoring/recording:	Recorded continuously, read remotely by TEIAS, and reported monthly on TEIAS Meter Reading Protocols sent electronically to the project proponent, Reported annually on the VCS Monitoring Report.
Value applied:	Will be determined at the monitoring stage
Monitoring equipment:	Main Electricity Meter Back-up Electricity Meter

[24] UEÇM: Uzlaştırmaya Esas Çekim Miktarı-Amount of Electricity based on Reconciliation.

	Both meters will be in compliance with the communiqué for Metering Devices to be used in the Electricity Market[25]. They have an accuracy class of Class002 indicating an accuracy range of 0.2%.
QA/QC procedures to be applied:	Measurements will be carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The minimum accuracy of the meters are Class02, that is to say should be within the ±0.2% (±0.002) range. The monthly reported meter readings by the main meters, will be cross-checked against the back up meters, if the reading difference is less than ±0.002 (±0.2%) than the meter readings are considered to be OK, if not than the meters will be checked. The monthly reported readings will also be cross checked against the monthly PMUM/MFRC screen shots. The PMUM/MFRC data of electricity sales will also be a proof for quality and reliability of data.
Calculation method:	Direct continuous measurement
Any comment:	Data will be used to calculate net electricity supplied to the grid.

Data / Parameter:	$EG_{PP\text{-}gross,\ y}$
Data unit:	MWh
Description:	Quantity of electricity produced by the power plant , in y
Measured /Calculated /Default:	Measured
Source of data:	The Primary source of data will be the main TEIAS meter recorded at the monthly reading protocols, the column related to gross electricity supplied to the Grid. The secondary source of data will be the PMUM/MFRC web site screen shots, the column with the heading ISVM[26].
Description of measurement methods and procedures to be applied:	Measurements are to be made by electricity meters, that belong to the grid operator, TEIAŞ. The meters will be in compliance with the collected data. Data will be used to calculate the net electricity supplied to the grid,
Frequency of monitoring/recording:	Recorded continuously, read remotely and reported monthly on TEIAS Meter Reading Protocols that are sent to project proponent electronically, Reported annually on the VCS Monitoring Report.
Value applied:	Will be determined at the monitoring stage
Monitoring equipment:	One main electricity meter One back-up electricity meter All meters will be in compliance with the communiqué for Metering Devices to be used in the Electricity Market[27]. They have an accuracy class of Class 002 indicating an accuracy range of 0.2%.
QA/QC procedures to be applied:	Measurements will be carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The minimum accuracy of the meters are Class02, that is to say should be within the ±0.2% (±0.002) range. The monthly reported meter readings by the s meter will be cross-checked against the back up meters. if the reading difference is less than ±0.002 (±0.2%) than the meter readings are

[25] The latest version of the communiqué (in Turkish) can be found in the following link: http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44
[26] ISVM: İletim Sistemine Veriş Miktarı-Amount Supplied to the Grid
[27] The latest version of the communiqué (in Turkish) can be found in the following link: http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44

	considered to be OK, if not than the meters will be checked. The monthly reported readings will also be cross checked against the monthly PMUM/MFRC screen shots. The PMUM/MFRC data of electricity sales will also be a proof for quality and reliability of data.
Calculation method:	Direct continuous measurement
Any comment:	Data will be used to calculate net electricity supplied to the grid.

Data / Parameter:	**Cap_{PJ}**
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:	17,500,000
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 three 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 Activity, when the reservoir is full.
Measured /Calculated /Default:	Indirectly measured based on Depth-Volume-Area correlation curve provided in Annex 5.
Source of data:	Surface area determined using the water depth values and the correlation graphic provided in Annex-5 of this PD.
Description of measurement methods and procedures to be applied:	The reservoir area corresponding to maximum operational level has been determined via a correlation curve, presented in Annex 4.
Frequency of monitoring/recording:	Once during each monitoring period
Value applied:	597,000
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 Description of the 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 archival 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 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 coordinates will be measured by GPS around the border of the reservoir area.

Monitoring procedures

Before the start of crediting period the Project Activity, a VER team will be assigned to be responsible for the implementation of the monitoring program - namely data collection, archive and quality control. A team manager will be assigned. The roles and responsibilities of all employees involved in monitoring program will have clearly defined and the employees will undergo training by the monitoring team manager.

A formal set of monitoring procedures will be established prior to the start of the crediting period. These procedures will detail the organization, control and steps required for certain key monitoring features, including:

1. Staff training.
2. Monitoring equipment.
3. Data collecting and recording.
4. Data management
5. Quality control and quality assurance.

Staff training

The VER Manager will be responsible for ensuring that procedures are followed on site and for continuously improving the procedures to ensure the reliability of the monitoring system. All staff involved in the VER project will receive training from the monitoring team manager. Records of staff training will be retained by the Project Owner. The manager will ensure that only trained staff is involved in the operation of the monitoring system.

Monitoring equipment

Electricity meters

The main and back-up electricity meters will be bi-directional for quantifying the electricity delivered by Project Activity to the grid will be installed at the end of the transmission line. This will form the electricity supply figure on the receipt of sales provided to the grid company by the Project Owner. The meters will be in compliance with the standards of the Turkish Standards Institute and will have obtained a "Type and System Approval" certificate from the Ministry of Trade and Industry. In case there are modifications to the standards, the modified standard shall be valid; and in case a valid standard is cancelled or abolished, the new standard shall be valid. The standards that will be used is TS-620 EN 60044-1 and TS718 IEC60044.2 for main and secondary meters, respectively. The sensitivity of the main and secondary meters are CI = 0.2 for active and reactive energy. The meters shall be factory calibrated by the manufacturer before installation. Records of the meter (type, model and calibration documentation) will be retained in the quality control system.

Data Collecting and Recording

Metering Electricity Delivered to the Grid (the main meter)

At the end of each month, at precisely midnight (00:00), the monthly generation will be read by both a State representative and the plant manager to determine the invoiced generation amount. In case of failure of the main meter, secondary meter is used to determine the invoiced generation amount.

Measuring Installed Capacity

By means of the SCADA system established in the plant all kinds of technical parameters related with turbines and generators including installed capacity will be measured and stored in the system on real time basis. The installed capacity of the plant will be measured from SCADA once a year while the plant is operated with full load and the related data will be stored as per the monitoring program.

Measuring Reservoir Area

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 coordinates will be measured by GPS around the border of the reservoir area once a year and related data will be stored as per the monitoring program. The GPS readings will be done while the water elevation in the reservoir is at maximum operational level.

Data management

At the end of each month, electricity supplied to the grid will be entered into an electronic spreadsheet. The data to be measured for installed capacity and reservoir are will be entered into an electronic spreadsheet at the end of each year. The electronic files will have a CD back-up.

Quality Control and Assurance (QC/QA)

Both the main and secondary meters are owned and installed by the grid company. The grid operator's Metering Officer should be notified of any failure of one of the meters. He is the only one authorized to deal with fixing, calibrating, or changing the meters, which will be done either by the grid operator or by a company authorized by the grid operator.

The Project Owner will keep electricity sale related PMUM/MFRC records, to which the recorded data will be compared.

All written documentation such as maps, drawings, the pre-EIA and the feasibility study, will be stored and available to the verifier so that the reliability of the information may be checked.

All the data and documentation related to the verification will be archived for minimum two years after the end of the first crediting period.

5 ENVIRONMENTAL IMPACT

In accordance with the “Environmental Law” No. 2872 (Issued in 1983), Annex 2 of Environmental Impact Assessment (EIA) Regulation (issued in 1993 and revised in 2001), run-of-river type HEPPs with an installed capacity of 50 MW or less are not subject to an EIA investigation or report preparation. For these types of projects, a preliminary EIA report including general information on the project and general project characteristics have to be submitted to The Ministry of Environment and Forestry. At the end of the review of the report, the Ministry may issue a verification stating that “there is no need for an EIA report”. The verification for the Project was granted.

Some possible environmental impacts during construction and operating phases stated in the preliminary EIA are summarized in the following:

Air quality

Models of dust flow and emissions from the project activity in relation to the nearest residential areas revealed no significant effects and values were well within the regulation standards. The provisions of “Regulations for Control of Air Pollution Caused by Industrial Facilities", announced in the Official Gazette No. 26236, dated 22/07/2006, will be observed during construction.

Noise

Modelling the noise level of the site predicted that both day and night time noise levels around the nearest residential areas will be within the standards of the “Day and night noise limits for Rural Areas and Settlement Areas" in accordance with the Article 25 of the Regulations for Evaluation and Management of Environmental Noise announced in the Official Gazette No. 25862 on 01.07.2005.

Water quality

The project activity is not expected to have any effect on water quality. No pollution from any source will be emitted into the river from the operation of the plant. Hazardous Material and Waste Obtaining, handling and transportation of the benzene and oil that will be used during

construction will be done in accordance with the "Control of Hazardous Waste Directives" which were published in the Official Gazette number 25755 on March 14th 2005 and the "Control of Oil Wastes Directives" which were published in the Official Gazette number 25353 on January 21st 2004. All activities related to fuels and oils will be done in a drained area to prevent leakage, and the drained excess fuels and oils will be transferred to waste treatment facilities.

Other hazardous waste materials such as used tires, used batteries, cables, paint, barrels, oil contaminated soil, oil preserving filters, etc., will be piled in a designated are on site temporarily in accordance with Control of Hazardous Waste Directive which was published in the Official Gazette dated March 14th, 2005 and numbered 25755 and will ultimately be transported to the nearest hazardous waste recycling or discharge plants.

As there was no settlement in the reservoir area, resettlement was not needed for the Project Activity.

6 STAKEHOLDER COMMENTS

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

A public meeting with stakeholders regarding the planned project activity was conducted in the meeting hall of Ömer Akyıldız Kıraathanesi Kumköy Köyü, Çarşamba, Samsun province, on October 3rd 2007. The meeting was organized and conducted by Çınar Mühendislik Müşavirlik ve Proje Hizmetleri Ltd. Şti. This meeting was the first dialogue ever conducted with stakeholders which was unfamiliar with the concept and its importance. By doing so, the Project Activity contributed to establishing a dialogue with stakeholders as common practice in other projects. To prepare for the meeting, key stakeholders, such as village heads (muhtars), government officials such as, the Kaimakam and the DSI personnel, and the local inhabitants in Çarşamba were identified and notified about the event.

For the participation of officials, phone calls were made to the Samsun Governorship and the Provincial Environment and Forestry Directorship Çarşamba Kaimakam's Office. For the participation of the local villagers, a fax notification and personal invitations were sent to the Çarşamba municipality and to Kumköy and Orduköy villages inviting their residents. In addition, the event was announced in the regional and national newspapers calling for stakeholders to attend the meeting. The ads were published at the Samsun Halk Gazette (regional), and the Türkiye Gazette (national). Both ads were published on September 28th 2007 and had the following wording (translated from Turkish):

"A public participation meeting regarding the Carbon Trade procedure will be conducted for Kumköy HEPP, which is planned to be built in Samsun province by AES-IC İçtaş Enerji Üretim ve Ticaret A.Ş. The dialog meeting will be done in order to inform the people about the Project Activity, learn about their opinions and concerns, answer their questions and receive suggestions. The event will be conducted at the meeting hall of Ömer Akyıldız Kıraathanesi Kumköy Köyü, Çarşamba, Samsun province, at 11:00 am on October 3rd 2007. For more information, please contact the developing company AES-IC İçtaş Enerji Üretim ve Ticaret A.Ş by phone: 312-467 35 03 or by fax:-312- 467 29 51 or the organizing company: Çınar Mühendislik Müşavirlik ve Proje Hizmetleri Ltd. By phone: 312- 472 38 39 or fax: 312- 472 39 33.

32 people attended (participants' information is available). The meeting included a presentation, a dialog session, and a personal questionnaire. Informational brochures (can be provided) summarizing all the

information presented were handed to all participants with contact information of a representative for any further questions and clarifications. The presentation included:

1. General description of run-of-river type hydro plant.
2. Specific technical details of the Project Activity including information and location of each component shown on a topographic map.
3. Environmental impact assessment of the project activity.
4. The issue of global warming and climate change.
5. The Kyoto protocol and emission reduction credits.
6. The role of the projects within the context of climate change.
7. Details and contact information of the developer, and a contact person for any information and clarifications.

Summary of the comments received:

After the presentation, participants were encouraged to comment on the Project Activity, raise any concerns they may have, ask questions or request clarifications. The villagers expressed their overall satisfaction with the implementation of such a Project in their region, and expressed their hope that after many years of delays, the Kumköy Project will finally be completed. The following issues were discussed:

The local villagers asked about employment possibilities. The Owner promised that when hiring unskilled workers during the construction and operation of the project activity, priority will be given to the local villagers.

The only concerns were related to the side embankments of the weir and doubts about whether they can reliably prevent flooding of the nearby villages. The Owner replied that to the best of its knowledge, they can be trusted. However, planning and construction will be done by DSI, and are not under the responsibility of the Owner.

The following table summarizes the results of the questionnaires. 11 questionnaires were completed. The mean age was 41.1 and all were males (more statistics are available).

The results suggest that the locals think that the most urgent problem of the region is unemployment followed by poverty and insufficient land. There were no specific environmental problem that concerned the locals more than others, and environmental issues need to be solved by the government. All people see clear signs of climate change in the region in recent years.

The villagers are not satisfied with the electricity infrastructure or prices, and they believe that the project activity may contribute to improving the situation. Everyone have their support for hydroelectric projects, which are perceived as the preferable mean for electricity production. Everyone also believed that the presentation was clear. The majority believed that the presented information was genuine; however, a considerable amount believed that some important issues were not presented. The Project Activity received high ranking for overall satisfaction as having a

positive contribution to solving global and local environmental problems, and for solving general local issues.

Most urgent problems of the region (%)	Unemployment	Insufficient land	Health	Poverty
	37	21	5	21
Profound environmental problems (%)	Excess use of Chemicals	Loss of Biodiversity	Habitat Destruction	Water Pollution
	22	22	22	22
Responsibility of solving environmental problems (%)	Government	Municipality	Private Entities	
	90	5	5	
	Yes (%)	No (%)		
Did you notice any evidences for climate change? (Such as decrease in precipitations and river flow, or temperature increase)	100	0		
Are electricity outages occur often?	74	26		
Are electricity prices too high?	92	8		
Do you support hydroelectric Plants in general?	100	0		
If so, why?	All answerered: Insufficient energy			
The most preferable mean of electricity production (%)	Hydro	Nuclear	Thermal	
	100	0	0	
Was the presentation clear?	Yes (%)	No (%)		
	100	0		
Do you believe that the information presented was genuine? (with no hidden information)	58	42		
	From 1-5			
The contribution of the project to reducing greenhouse gas emissions?	4,6			
Contribution of the project to the environment	4,6			
Will the project help solve unemployment problems?	4,5			
Overall support of the project	4,8			

Annex-1: The Legal Framework of the Host Country That Binds the Project Activity

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:
- Occupational Health and Safety Statute, Official Gazette No. 14765 dated April 11, 1974;
- 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;

Annex-2: Baseline Information

Table 1: http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakıt46-49/47.xls

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKIT MİKTARLARININ ÜRETİCİ KURULUŞLARA DAĞILIMININ YILLAR İTİBARİYLE GELİŞİMİ
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI 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 *Fuel Oil*	Asıl Yakıt *Main Fuel*	239,410	16,864	27,098
		Yrd. Yakıt *Auxiliary Fuel*	134,007	105,073	118,439
		TOPLAM *TOTAL*	**373,417**	**121,937**	145,537
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	45,364	4	0
		Yrd. Yakıt *Auxiliary Fuel*	72,956	18,901	13,984
		TOPLAM *TOTAL*	**118,320**	**18,905**	13,984
	TOPLAM	*TOTAL*	**491,737**	**140,842**	159,521
	Doğal Gaz	*Natural Gas*	5,091,011	4,493,275	4,173,420
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	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*	Taşkömür+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	*Naphta*	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
TÜRKİYE *TURKEY*	Taşkömür+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	*Naphta*	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**

Not:Ayrıca Otoprodüktör santrallarda 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 CO_2 Emission Factors

Fuel Type:	EF (tCO2/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/yakıt46-49/49.xls

http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakıt46-49/49.xls

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)

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*	**Asıl Yakıt** *Main Fuel*	2,301	162	261
		Yrd. Yakıt *Auxiliary Fuel*	1,286	1,009	1,137
		TOPLAM *TOTAL*	**3,587**	**1,171**	**1,398**
	Motorin *Diesel Oil*	**Asıl Yakıt** *Main Fuel*	467	0	0
		Yrd. Yakıt *Auxiliary Fuel*	751	195	144
		TOPLAM *TOTAL*	**1,219**	**195**	**144**
	TOPLAM	*TOTAL*	**4,806**	**1,366**	**1,542**
	Doğal Gaz	*Natural Gas*	**42,335**	**37,354**	**34,621**
	TOPLAM	*TOTAL*	**135,949**	**124,676**	**133,026**
MOBİL SANTRALLAR *MOBIL POWER PLANTS*	**Fuel-Oil**	***Fuel Oil***	0	0	0
	Motorin	***Diesel Oil***			
	TOPLAM	***TOTAL***	**0**	**0**	**0**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	**Taşkömür+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*	**Taşkömür+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

			2009	2010	2011
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	**Taşkömürü**	*Hard Coal*	22,828,163	20,892,383	23,074,208
	Linyit	*Lignite*	348,995,433	338,990,622	382,472,805
	TOPLAM	*Total*	**371,823,595**	**359,883,005**	405,547,013
	Fuel-Oil *Fuel Oil*	**Asıl Yakıt** *Main Fuel*	9,632,696	679,656	1,091,289
		Yrd. Yakıt *Auxiliary Fuel*	5,386,180	4,223,229	4,760,433
		TOPLAM *TOTAL*	**15,018,876**	**4,902,885**	5,851,723
	Motorin *Diesel Oil*	**Asıl Yakıt** *Main Fuel*	1,956,278	159	0
		Yrd. Yakıt *Auxiliary Fuel*	3,146,162	815,082	603,737
		TOPLAM *TOTAL*	**5,102,441**	**815,241**	603,737
	TOPLAM	*TOTAL*	**20,121,317**	**5,718,126**	6,455,459
	Doğal Gaz	*Natural Gas*	**177,247,713**	**156,392,061**	144,950,365
	TOPLAM	*TOTAL*	**569,192,626**	**521,993,192**	556,952,838
MOBİL SANTRALLAR *MOBIL POWER PLANTS*	**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*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	124,253,075	144,680,890	217,948,438
	Linyit	*Lignite*	59,852,102	65,249,084	66,392,055
	TOPLAM	*Total*	**184,105,177**	**209,929,975**	284,340,493
	Fuel-Oil	*Fuel Oil*	48,452,601	30,974,336	16,254,037
	Motorin	*Diesel Oil*	2,560,350	61,818	45,552
	Lpg	*Lpg*	5,158	0	0
	Nafta	*Naphta*	352,524	440,154	0
	TOPLAM	*TOTAL*	**51,370,633**	**31,476,308**	16,299,589
	Doğal Gaz	*Natural Gas*	**602,609,967**	**657,887,178**	701,051,608
	TOPLAM	*TOTAL*	**786,715,144**	**867,817,153**	985,392,101
TÜRKİYE *TURKEY*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	147,081,237	165,573,274	241,022,646
	Linyit	*Lignite*	408,847,535	404,239,706	448,864,860
	TOPLAM	*Total*	**555,928,772**	**569,812,980**	**689,887,506**
	Fuel-Oil	*Fuel Oil*	63,471,478	35,877,221	22,105,760
	Motorin	*Diesel Oil*	7,662,790	877,059	649,289
	Lpg	*Lpg*	5,158	0	0
	Nafta	*Naphta*	352,524	440,154	0
	TOPLAM	*TOTAL*	**71,491,950**	**37,194,434**	**22,755,049**
	Doğal Gaz	*Natural Gas*	**779,857,681**	**814,279,239**	**846,001,974**
	TOPLAM	*TOTAL*	**1,407,278,403**	**1,421,286,653**	**1,558,644,529**

Table 5:
Source: Computation based on Table 3 (in Annex-2) provided above.

NET CALORIFIC VALUES OF FUELS CONSUMED IN THE THERMAL POWER PLANTS

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*	Asıl Yakıt *Main Fuel*	40.24	40.30	40.27
		Yrd. Yakıt *Auxiliary Fuel*	40.19	40.19	40.19
		TOPLAM *TOTAL*	**40.22**	**40.21**	40.21
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	0.00	1.00	0.00
		Yrd. Yakıt *Auxiliary Fuel*	43.12	43.12	43.17
		TOPLAM *TOTAL*	**43.12**	**43.12**	43.17
	TOPLAM	*TOTAL*	**40.92**	**40.60**	40.47
	Doğal Gaz	*Natural Gas*	34.82	34.81	34.73
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	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

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	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**
Ü	FUEL-OİL	*Fuel Oil*	974.4	62.2	103.0
	MOTORİN	*Diesel oil*	0.2	0.0	0.0
A	SIVI TOPLAMI	*Liquid Total*	**974.6**	**62.2**	**103.0**
	DOĞAL GAZ	*Natural Gas*	**17,225.5**	**15,289.4**	**13,939.9**
Ş	TERMİK TOPLAM	*Thermal Total*	**42,446.5**	**37,881.0**	**36,635.9**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+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**	
	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+Jeothermal+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+Jeothermal+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)

TÜRKİYE ELEKTRİK ENERJİSİ ÜRETİM - TÜKETİM VE KAYIPLARININ YILLAR İTİBARİYLE 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

YILLAR *YEARS*	BRÜT ÜRETİM *GROSS GEN*	ARTIŞ % *INCREASE*	İÇ İHTİYAÇ *INTER CONSUMPTION*	%	NET ÜRETİM *NET GEN*	İTHALAT *IMPORTS*	ŞEBEKEYE VERİLEN[1] *SUPPLIED TO THE NETWORK*[1]	ŞEBEKE KAYBI / *NETWORK LOSSES* İLETİM *TRANSMISSION*	%	DAĞITIM *DISTRIBUTION*		TOPLAM *TOTAL*	%	İRACAT[2] *EXPORTS*[2]		NET TÜKETİM *NET CONS.*		ARTIŞ % *INCREASE*
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	2306.8	6.7	31912.1	2142.4	34054.5	1611.4	4.7	2734.5		4345.9	12.8			29708.6		7.5
1986	39694.8	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	907		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	506		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	314		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	589		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	570		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	696		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	343		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	129399.5	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,Sınırda teslim esasına göre yapıldığından,ihracat ile ilgili şebeke kaybı,iletim kaybının 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 lossss 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/KAPASITEPROJEKSIYONU2011.pdf

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
SELİMOĞLU REG. VE HES	0.00	0.00	0.00	Private	Hydro	7-Jan-10
KULP IV HES (YILDIZLAR EN.ELK.ÜR.AŞ.)	12.30	41.00	23.00	Private	Hydro	13-Jan-10
TUZLA JEOTERMAL	0.00	0.00	0.00	Private	Jeothermal	13-Jan-10
ROTOR ELEKTRİK (OSMANİYE RES)	0.00	0.00	0.00	Private	Wind	14-Jan-10
CİNDERE HES (İlave)	9.07	28.29	16.07	Private	Hydro	21-Jan-10
ETİ SODA ÜRE.PAZ.NAK.VE ELK.ÜRE.SAN.	24.00	144.00	144.00	Autoproducer	Lignite	22-Jan-10
BAYBURT HES (BAYBURT ENERJİ ÜRET.)	14,6	51.00	24.00	Private	Hydro	28-Jan-10
UZUNÇAYIR HES (Tunceli) (İlave)	0.00	0.00	0.00	Private	Hydro	28-Jan-10
ALTINMARKA	4.60	37.02	37.02	Autoproducer	Natural Gas	28-Jan-10
CAN TEKSTİL (Çorlu/TEKİRDAĞ)	7.83	60.25	60.25	Autoproducer	Natural Gas	28-Jan-10
ALAKIR HES (YURT ENERJİ ÜRETİM)	2.06	6.00	4.00	Private	Hydro	29-Jan-10
CEV ENERJİ ÜRETİM (GAZİANTEP ÇÖP Biogasl)	0.00	0.00	0.00	Private	Biogas	1-Feb-10
AKBAŞLAR (İlave)	1.54	1.54	12.08	Autoproducer	Natural Gas	18-Feb-10
ASA ENERJİ (KALE REG.ve HES)	9,6	0.00	0.00	Private	Hydro	19-Feb-10
PETA MÜHENDİSLİK EN. (MURSAL II HES)	4.50	19.00	11.00	Private	Hydro	19-Feb-10
HETAŞ HACISALİHOĞLU (YILDIZLI HES)	1.20	5.00	3.00	Private	Hydro	23-Feb-10
ORTADOĞU ENERJİ (ODA YERİ) (Eyüp/İST.)	0.00	0.00	0.00	Private	LFG	24-Feb-10
KONYA ŞEKER SAN. VE TİC. A.Ş.1	6.00	36.00	36.00	Autoproducer	Lignite	26-Feb-10
GLOBAL ENERJİ (PELİTLİK)	3.54	27.06	27.06	Private	Natural Gas	26-Feb-10
ASMAKİNSAN (BANDIRMA 3 RES)	20.00	0.00	0.00	Private	Wind	26-Feb-10
FLOKSER Tekstil (Çatalça-İstanbul)(Süetser tesisi)	-2.13	0.00	0.00	Autoproducer	Natural Gas	28-Feb-10
RASA ENERJİ (VAN)	26.19	166.62	166.62	Private	Natural Gas	3-Mar-10
ROTOR ELEKTRİK (OSMANİYE RES)	17.50	0.00	0.00	Private	Wind	10-Mar-10
SOMA ENERJİ ÜRETİM (SOMA RES)	4.50	0.00	0.00	Private	Wind	10-Mar-10
DOĞUBAY ELEKTRİK (SARIMEHMET HES)	3.10	10.00	6.00	Private	Hydro	11-Mar-10
DENİZ ELEKTRİK (SEBENOBA RES)	10.00	0.00	0.00	Private	Wind	12-Mar-10
AKDENİZ ELEKTRİK (MERSİN RES)	33,0	0.00	0.00	Private	Wind	19-Mar-10
AKSA ENERJİ (ANTALYA)	25.00	192.50	192.50	Private	Natural Gas	20-Mar-10
NURYOL ENERJİ (DEFNE REG. VE HES)	7.23	22.00	13.00	Private	Hydro	26-Mar-10
MENDERES GEOTERMAL DORA-2	0.00	0.00	0.00	Private	Jeothermal	26-Mar-10
ASMAKİNSAN (BANDIRMA 3 RES)	4.00	0.00	0.00	Private	Wind	26-Mar-10
ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	5.91	0.00	0.00	Private	Hydro	1-Apr-10
BİRİM HİDR. ÜRETİM AŞ. (ERFELEK HES)	3.23	9.50	5.50	Private	Hydro	3-Apr-10
BEYTEK EL. ÜR. A.Ş. (ÇATALOLUK HES)	9,5	0.00	0.00	Private	Hydro	7-Apr-10
NİSAN E.MEKANİK EN. (BAŞAK REG. HES)	6.85	22.00	12.00	Private	Hydro	9-Apr-10

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	Autoproducer	Biogas	21-Apr-10
YILDIZ ENTEGRE AĞAÇ (Kocaeli)	12.37	79.79	79.79	Autoproducer	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	Autoproducer	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			Autoproducer	NAFTA	23-Jun-10
ÇAMLIKAYA REG. VE HES	5.65	19.00	11.00	Private	Hydro	30-Jun-10
ERİKLİ-AKOCAK REG. ve AKOCAK 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-AKOCAK REG. ve AKOCAK 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 (Düzeltme)	-18.07	0.00	0.00	Private	Hydro	25-Oct-10
ITC ADANA BİOKÜTLE SANT. (Düzeltme)	0.00	0.00	0.00	Private	LFG	25-Oct-10
ENERJİ-SA (BANDIRMA) (Düzeltme)	-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) (İlave)	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-OİL	31-Dec-10
SİLOPİ ELEKTRİK ÜR. A.Ş. (ESENBOĞA)	-44.78	0.00	0.00	Private	FUEL-OİL	31-Dec-10
INTERNATIONAL HOSPITAL İSTANBUL AŞ.	0.77	6.00	6.00	Autoproducer	Natural Gas	31-Dec-10
TÜPRAŞ RAFİNERİ (İZMİT) (Düzeltme)	-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/KAPASITEPROJEKSIYONU2012.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 AKRİLİK (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) (Düzeltme)	0.60	4.47	4.47	AUTOPRODUCER	NATURAL GAS	Unknown
FRAPORT IC 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
GOREN-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
ERKENEK (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 (BATIÇİM 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 (Dörtyol) (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 I 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 Production 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 (Zamantı-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
NARİNKALE 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 (Düzeltme))	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

Annex-3: The EIA Exemption Certificate of the Project Activity

T.C.
Çevre ve Orman
Bakanlığı

T.C.
SAMSUN VALİLİĞİ
İL ÇEVRE VE ORMAN MÜDÜRLÜĞÜ

Karar Tarihi : 30.../.07../2007
Karar No: 502 – 806

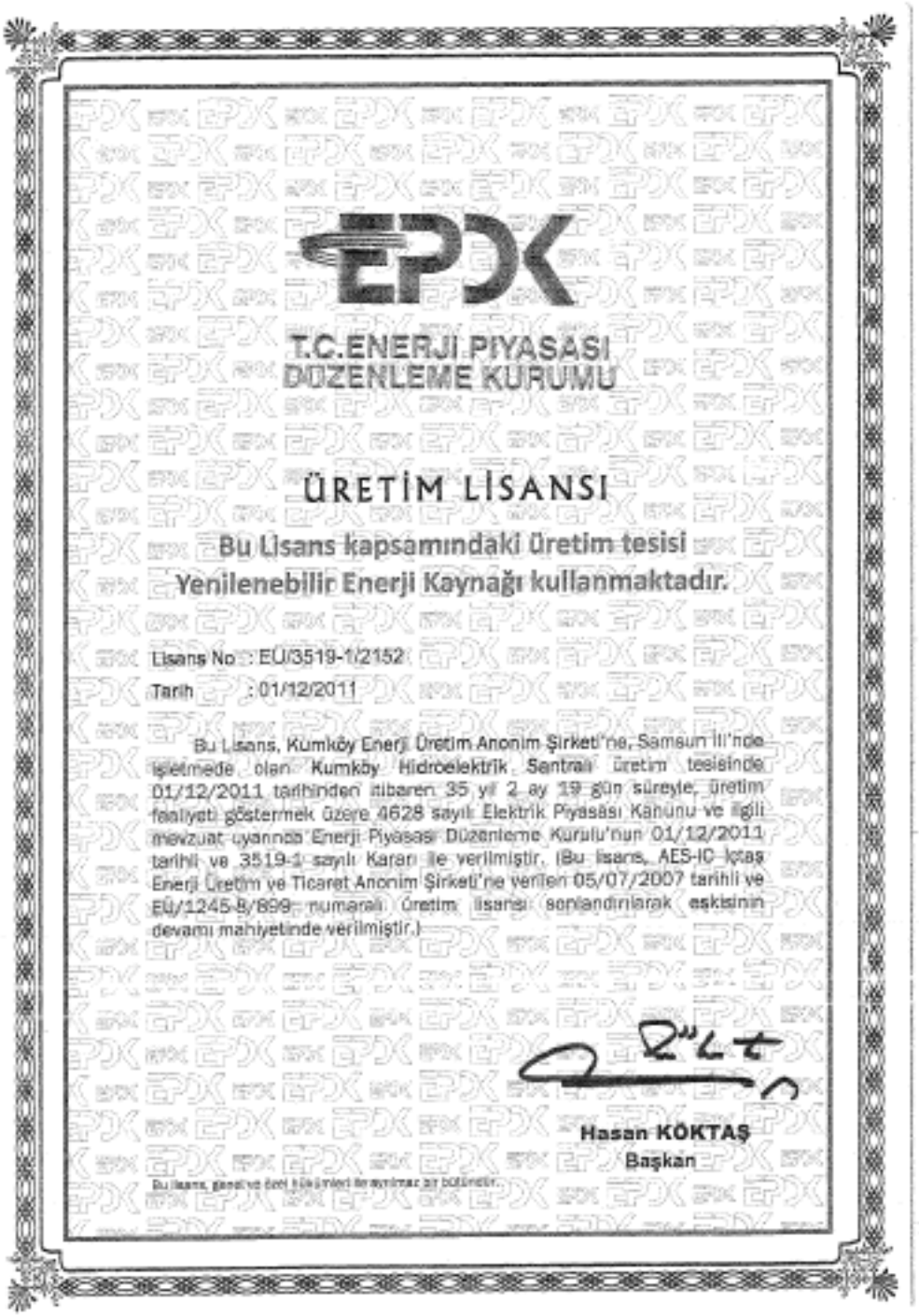
ÇED GEREKLİ DEĞİLDİR BELGESİ

16 Aralık 2003 tarih ve 25318 sayılı Resmi Gazete' de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliğinin 17. maddesi gereğince; "Kumköy Regülatörü ve Kumköy HES" projesi hakkında "*ÇED Gerekli Değildir Kararı*" verilmiştir.

Ramazan AKSOY
Vali Yardımcısı
İl Mahalli Çevre Kurulu Başkanı

Proje Sahibi : AES-IC İçtaş Enerji Üretim ve Tic. A.Ş.
Projenin Yeri : Samsun İli, Çarşamba İlçesi Ordu Köyü

Annex-4: The Electricity Generation License



EPDK

T.C.ENERJİ PİYASASI
DÜZENLEME KURUMU

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi
Yenilenebilir Enerji Kaynağı kullanmaktadır.

Lisans No : EÜ/3519-1/2152

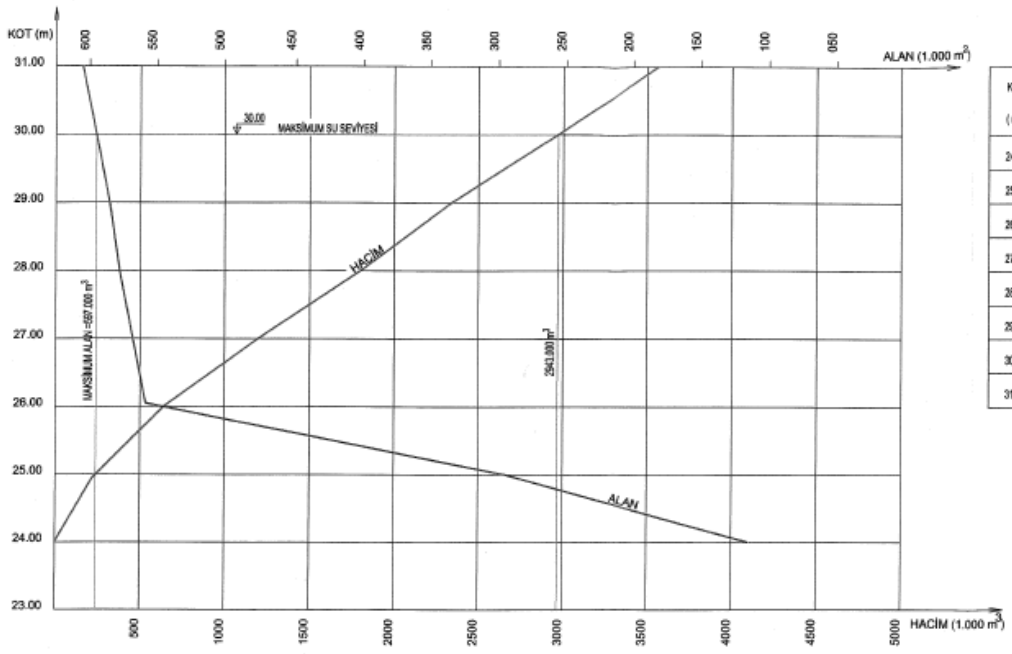
Tarih : 01/12/2011

Bu Lisans, Kumköy Enerji Üretim Anonim Şirketi'ne, Samsun İli'nde işletmede olan Kumköy Hidroelektrik Santrali üretim tesisinde 01/12/2011 tarihinden itibaren 35 yıl 2 ay 19 gün süreyle, üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 01/12/2011 tarihli ve 3519-1 sayılı Kararı ile verilmiştir. (Bu lisans, AES-IC İçtaş Enerji Üretim ve Ticaret Anonim Şirketi'ne verilen 05/07/2007 tarihli ve EÜ/1245-8/899 numaralı üretim lisansı sonlandırılarak eskisinin devamı mahiyetinde verilmiştir.)

Hasan KÖKTAŞ
Başkan

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

Annex-5: The Volume Area Curve of the Project Activity



KOT (m)	ALAN 1000 m²	HACİM 1000 m³	ΣV 1000 m³
24.00	113		0.00
		203.50	
25.00	294		203.50
		427.00	
26.00	560		630.50
		564.50	
27.00	569		1195.00
		573.50	
28.00	578		1768.50
		582.50	
29.00	587		2351.00
		592.50	
30.00	597		2943.00
		601.50	
31.00	606		3544.50