AKBAS HYDROELECTRICITY POWER PLANT

Document Prepared By Ekobil Environmental Services and Consulting Ltd.

Contact Information : info@ekobil.com

Project Title	Akbas Hydroelectricity Power Plant
Version	2.0
Date of Issue	February 1st, 2013
Prepared By	Ekobil Environmental Services and Consultancy
Contact	Güneykent Sitesi 51. Cadde 1839. Sokak No:56 Ahlatlıbel 06481 ANKARA/Turkey Tel: +90.312 891338 E-mail: info@ekobil.com

TABLE OF CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Project

Arı Su Enerji ÜretimA.Ş. is planning to construct Akbas Hydroelectric Power Plant (HPP) on the Buyuk Menderes River, within the Aegean Geographical District of Turkey, in the borders of Çal Town of, Denizli Province. The purpose of the project is electricity production using the potential energy of Buyuk Menderes River as a renewable resource. Therefore, the electricity is going to be produced without causing airborne pollutants or Green House Gas (GHG) emissions. The construction and operation of the Akbas Hydroelectric Power Plant (HPP) will be delaying the addition of conventional thermal power plants to the Turkish National Electricity Grid.

The set capacity of Akbas HPP is 12.26 MWe, with 3 turbines whereby two of them will be with 5,134 MWe capacity and an other one will be 1.989 MWe in capacity. Based on the available water and of the total capacity of the project, the project is expected to produce 45,52 MWh of electricity per year, based on revised feasibility studies. Based on Turkey's Combined Margin Emission Factor of 0.53985 tCO_{2e}/MWh, the project is expected to produce 24,574 tonnes of CO_{2e} GHG reductions each year.

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 Akbas 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 Urban Planning), in the form of an Project Introductory File[1]. The report was examined by the EIA evaluation committee coordinated by MoEF and it was decided that the project could proceed, so they have granted an EIA exemption certificate, in 01/07/2011. 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)[2] within the regulator for the downstream and upstream movement of the fish, to facilitate fish migration. In addition to this, the minimum water necessary for the sustainability of the aquatic life in the river will be released at all times. Based on the ecological survey reports the lifeline water amount is determined to be 1.233m^3/s, which accounts for the 15% of the average annual flow.

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

[1] The Project Introductory File (a pre-EIA Report) in the original language is presented to the validating DOE.
[2] The plans of the fish ladder are provided to the validating DOE

Table 1: Major Milestones of Akbas HPP Project

Date	Event	Reference
15-Jun-09	Initial Water Usage Agreement was signed with the first design parameters	Water Usage Agreement
03-Aug-2010	EMRA granted licence number 1456-10 to Arı Su Enerji Üretim Ltd. for the Akbaş HPP.	Production License Cover Page
17-Feb-11	EMRA Approved the amendment request in the Electricity Production Licence and issued Licence number EÜ/2679-3/1664 to Ari Su Enerji Uretim A.S. For 49 years.	Revised Licence
11-Mar-11	The Amended Water Usage Agreement was signed	Water Usage Agreement
21-April-11[3]	Andritz Hydro and Indar Electrics contracted for the electromechanical equipment.	MOU to Contract With Andritz Hydro and Indar Electronics
22-Apr-11	Ecosystem Evaluation Report was prepared	Ecosystem Report Cover Page
20-May-11	Construction Started	NHS Work Site opening Letter
1-Jul-11	The Project was granted the EIA Exemption Certification by the Denizli Provincial Representation of Ministry of Environement and Urban Planning	See Certification on Annex 3
10-Jan-12	Loan Agreement signed	Signature page
3-Aug-14	Expected commissioning date	License

The Akbas HPP is to be constructed, at the Büyük Menderes River, at the upstream of the Adigüzel Hydroelectric Power plant. The project is designed to be between the 535.00m – 457.72 m elevations.

The Akbas HPP will be equipped with an unregulated weir that will direct water to the energy tunnel that will be 3,648.00 m in length, then the water will be fed to the power house via the penstock that trificates to feed each one of the tree turbines, that will produce electricity via 3 horizontal type Francis turbines.

How the project activity will be operating is shown schematically below in Figure 1:

[3] This date is considered as the investment decision date

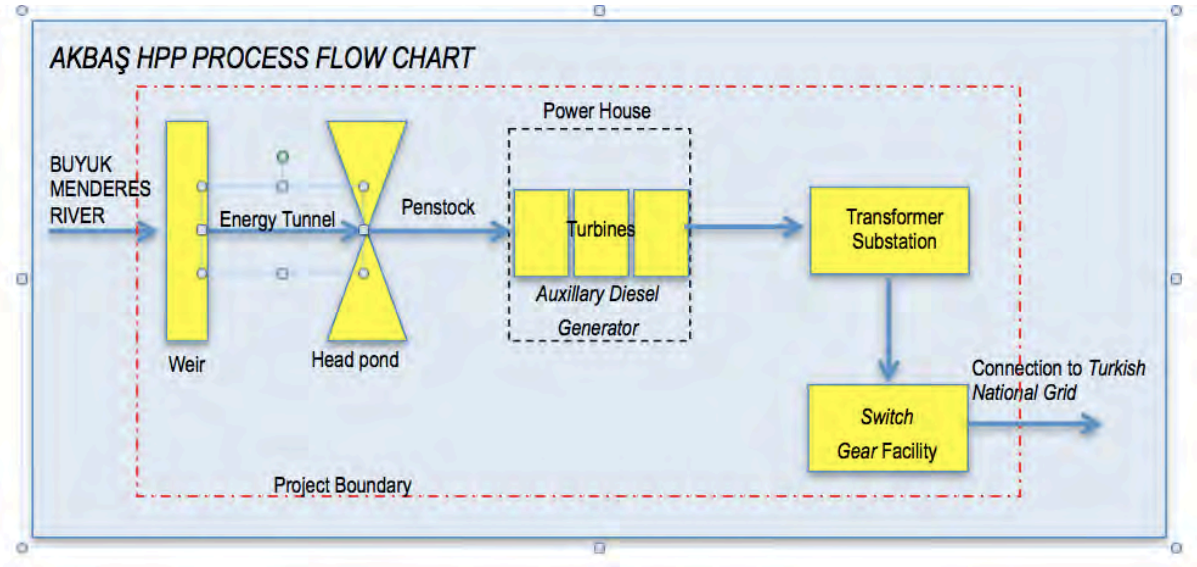

Figure 1: Flow chart showing the basic operational principles of the project activity.

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
ARI SU ENERJİ ÜRETİM A.Ş.	Project Owner – Implementation of the Project	Rasimpaşa Mah.Rihtim Cad.Petrol İşhani No:58/2 Kadiköy-İstanbul-Turkey TEL: +90312 438 79 14 FAX: +90312 438 83 77

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 (ÖYSEKENT) 51. Cad. 116. Sk. No: 56 Ahlatlıbel-ANKARA T:+90 312 489 13 38 E-mail:info@ekobil.com

1.5 Project Start Date

Project Start Date is: 03.08.2014. (or the commissioning date, which ever is the earliest.)

1.6 Project Crediting Period

The project crediting period is 10 years: 03.08.2014 (or the commissioning date, which ever is the earliest)-02.08.2024 (both days inclusive). The crediting period is renewable twice.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project	☑
Mega-project	☐

Years	
Year 0: 03.08.2014 to 31.12.2014	10,165
Year 1: 2015	24,573
Year 2: 2016	24,573
Year 3: 2017	24,573
Year 4: 2018	24,573
Year 5: 2019	24,573
Year 6: 2020	24,573
Year 7: 2021	24,573
Year 8: 2022	24,573
Year 9: 2023	24,573
Year.10: 2024(01.01.2024 to 02.08.2024)	14,407
Total estimated ERs	245,729
Total number of crediting years	10
Average annual ERs	24,573

1.8 Description of the Project Activity[4]

The Akbas HPP is designed to take water trough its unregulated weir, and transfer it to the power house via an energy tunnel and a penstock. The project activity has 12.26 MWe capacity and is expected to produce 45,52 MWh of electricity per year.

The Akbas HPP will be connecting to the Turkish National Power Grid via theAdıgüzel HPP Transformer Substation with a 14 km long transmission line. As the project will be operational, a reliable, continuous, independent from imported fossil fuels, and an uninterrupted high quality power at 154 kV voltage level will be supplied to consumers in Turkey. Thus, the implementation of the project will positively affect both Turkey's and the region's economy.

The project will involve collecting of water, at the 530 m level, by the help of the weir. After that the water will be transferred via a tunnel to the water intake body from which it will flow to the turbine units via the penstocks. The project has three turbine units, two with 5.134 MWe capacity and one with1.989 MWe. These turbines will be housed within the Hydroelectricity Power Plant (HPP) building. The water that will hit these three turbines, will then leave the turbines via the tail water canal and a spillway which is going to be located at a level of 457.72 m.

The following are the facilities to be constructed:

- The Akbas Weir, (equipped with a fish ladder) to be constructed at approximately 537 m elevation level (there will be a short canal to convey water from the weir to the water intake structure).
- Tunnel
- Water intake structure
- Penstock
- Hydroelectricity Power Plant building that will house the horizontal axis francis turbines and other electromechanical equipment
- Tail water canal and spillway
- The switch gear area and the transformers
- 14 km transmission line

General technical characteristics of Akbas HPP are given in Table 2.

Table 2: General technical characteristics of AkbasHPP

General Characteristics		
Place	Büyük Menderes Stream, Çal-Denizli	
Place	Büyük Menderes Stream, Çal-Denizli	
Drainage Area	4735,10	km^2
Mean Annual flow	14.40	m^3/sec
Two Year Frequency, Peak Flood flow Rate (Q_2)	39.00	m^3/sec
Five Year Frequency, Peak Flood flow Rate (Q_5)	43.70	m^3/sec
Ten Year Frequency, Peak Flood flow Rate (Q_{10})	58.40	m^3/sec

[4] Information provided in this chapter is taken from the Revised feasibility report, August 2009.

Twenty Five Year Frequency, Peak Flood flow Rate (Q_{25})		92.60	m^3/sec
Fifty Frequency, Peak Flood flow Rate (Q_{50})		124	m^3/sec
Hundred Year Frequency, Peak Flood flow Rate (Q_{100})		160	m^3/sec
Weir			
Type	Concrete, full body		
Base Elevation		524.7	m
Thalweg elevation		530	m
Weir threshold elevation		535	m
Weir Crest elevation		537.75	m
Maximum water level		537.3	m
Length of the outlet		27	m
Height of weir from the base		10.3	m
Height of the weir from the thalweg		5	m
Sedimentation Pool			
Length		51.93	m
Height		6.35	m
Width		20.8	m
Entrance base elevation		531.4	m
Exit base elevation		530.88	m
Slope		0.01	m/m
Water conveying tunnel			
Length		3648	m
Internal diameter		3.6	m
Slope		0.0009	m/m
Surge Chamber			
Base Elevation of the surge chamber		528.93 to 524.43	m
Operation Water Level		531.81	m
Penstock			
Diameter		2.5	m
Length		112.8	m
Power House Building			
Length		22.9	
Width		45.85	
Height		22.6	
Turbines			
Project Flow Rate		19.60	m^3/s
Unit Flow Rate (Units 1 and 2)		8.21	m^3/s
Unit Flow Rate (Unit 3) :		3.18	m^3/s
Tail water elevation		457.72	m
Turbine Axis elevation		456.22	m
Number of Units		3	
Turbine Type	Horizontal Axis Francis		
Gross Fall		74.09	m
Net Fall		72.92	m
Turbine Power		12.257	MWe
Unit Turbine Power (Units 1 and 2)		5.134	MWe
Unit Turbine Power (Unit 3)		1.989	MWe
Power Transmission Line			
Length	14 km		
Conductor cross section	477 MCM HAWK		
Connection Point	ADIGÜZEL HPP		
Annual Expected Power Generation (Present Case)	45,520		MWh
Annual Expected Power Generation (With more development in the upstream)	26,910		MWh

The project will be using horizontal type Francis turbines. The Francis type of turbine is a reaction type of turbine. In case of reaction turbines, the water approaches a set of curved blades mounted on a shaft and glides over them thereby changing direction and so imparting pressure on the blades due to centrifugal force, i.e. the force experienced by a passenger in a car when turning very fast. The water enters the blades nearly at a tangent and for the highest efficiency leaves the blades radially and at a reduced velocity. Francis turbines was invented by an English engineer J.B.Francis (1815 – 1892) water is delivered into a volute casing which completely surrounds the runner and is under pressure as well as velocity. The water is guided through both fixed and adjustable veins in the casing and glides onto the runner blades at an angle. The water then turns in the runner to exit parallel with the axis of rotation. The adjustable vanes cater for load changes. A bypass valve or a surge tank deals with sudden load changes. In a Francis turbine the entire wheel assembly is immersed in water and surrounded by a pressure casing. In a Francis turbine the pressure casing is spiral shaped and is tapered to distribute water uniformly around the entire perimeter of the runner. It uses guide vanes to ensure that water is fed into the runners at the correct angle. See the below Figure (Figure 2), for a schematic explanation of working principles of a Francis Turbine.

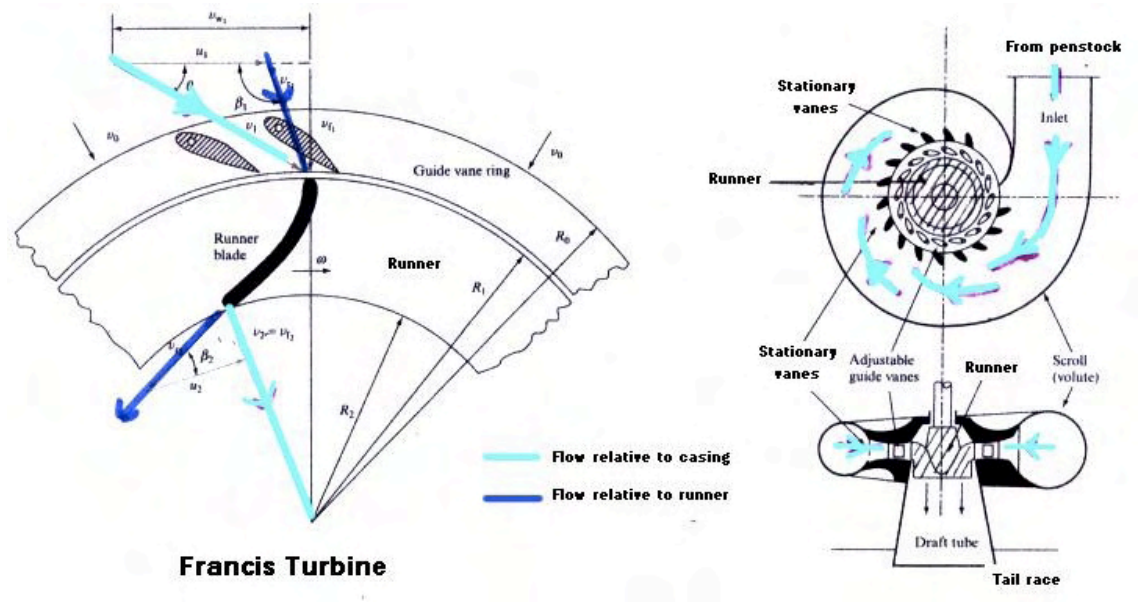

Figure 2:The working principle of a Francis type turbine, in case of the project activity the axis of the turbine will be parallel (horizontal) to the river bed.

The project owner is granted a production license for 49 years[5] including the 16 months project design and 32 months construction phase. The economic life time of a hydro power plant investment

[5] According to the production licence dated 3/08/2010 and numbered EÜ/2679-3/1664

is assumed to be about 50 years, based on the experts' committee report[6] 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[7].

The project is expected to produce 45,520 MWh of electricity per year. The annual electricity delivered to the grid by the project, would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. Based on this a combined margin emission reduction factor is calculated as detailed below in Chapter 3 of this document.

1.9 Project Location

The project is located at the Aegean geographical region of Turkey within the jurisdiction of Denizli, Province, near the Town Çal. The project is located at the Catchment of the Büyük Menderes River over the Büyük Menderes River, between the 535 and 457.72 m elevtions. The project Location is shown in the following location Map (Figure 3):

The project lies between 29°21' 34" and 29°19'36" Eastern Longitudes and Between 38°12' 25" and 38° 13' 44" Northern Latitudes.

The coordinates of the weir and the power house are given in the following table (Table 3)

Table 3: The coordinates of the weir and powerhouse of the project activity.

Point	Power house		Weir	
	Latitude:	Longitude:	Latitude	Longitude
1	38°13'49.61"N	29°19'33.06"E	38°12'33.74"N	29°21'21.94"E
2	38°13'50.35"N	29°19'35.31"E	38°12'35.23"N	29°21'23.79"E
3	38°13'49.23"N	29°19'35.97"E	38°12'34.40"N	29°21'24.88"E
4	38°13'48.47"N	29°19'33.68"E	38°12'32.91"N	29°21'23.10"E

[6] http://ekutup.dpt.gov.tr/enerji/oik585.pdf page 4.25 (Last visited on 13/3/2012)
[7] http://ekutup.dpt.gov.tr/enerji/oik585.pdf page 4.26 (Last visited on3/3/2012)

Figure 3: Google Earth view showing the location of the project area within Turkey (above) and in the Aegean region .

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 Proof of Title

Ownership of the plant, equipment and electricity generation licence belongs to Arı Su 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 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[8] cannot host CDM or JI projects.

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

[8] Turkey is a party to UNFCCC and listed in Annex -1, but the Marrakesh Accord at COP 7, "*Invites* the Parties to recognize the special circumstances of Turkey, which place Turkey, after becoming a Party, in a situation different from that of other Parties included inAnnex I to the Convention." As a result, even though Turkey has ratified Kyoto Protocol, she does not have a binding target under Annex-B, and as a result Turkey can not host CDM or JI projects.

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. Both conditions are satisfied for the Project activity.
- VCS v.3.3 accepts all six Kyoto gases. The Project aims to reduce CO_2, which is one of these six Kyoto gases.
- VCS v.3.3 accepts all technologies supported by an approved VCS 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

Project emissions: As per paragraph 21 of the Small Scale CDM Methodology AMS-I.D "CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" .

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The following UNFFCC methodology and its related tools are utilised:

Approved consolidated small scale CDM and monitoring methodology AMS-I.D "Grid connected renewable electricity generation." Version 17.0.

The Approved Methodology refers to the following tools:

"Tool to calculate the emission factor for an electricity system". (Version 2.2.1)

"Guidelines on the Demonstration of Additionality of Small-Scale Project Activities" (Version 09.0)

"Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 02)

2.2 Applicability of Methodology

The methodology AMS-I.D (Version 17.0) is applicable to the proposed project because the proposed project meets all the applicability criteria stated in the methodology:

The methodology is applicable under the following conditions:

- The Project activity is a renewable electricity project (hydroelectric);
- The Project activity is not a combined heat and power (co-generation) system;
- The Project activity has an output capacity lower than 15 MW (Decision -/CMP2 paragraph 28 (a)): the Project has an installed capacity of 12.26 MW; and
- Electricity generated by the Project activity is supplied to the Grid that is or would have been supplied by at least one fossil fuel fired generating unit)

2.3 Project Boundary

Table 3 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 3.

The project boundary includes net electricity generated and supplied to the Turkish national grid. The internal consumption and the GHG due to the temporary use and burning of the diesel fuel by the auxiliary power generators.

Table 4: Main gases included in the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Electricity generation in baseline (Turkey's Grid)	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_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/m2)
		N_2O	No	Minor emission source
		Other	N.A.	N.A.
	Auxiliary Diesel Generator [9]	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	N.A.	N.A.

2.4 Baseline Scenario

The baseline scenario is defined based on the Small Scale Methodology AMD-I.D., (paragraph 10) as follows:

"The 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 into the grid.."

Based on AMD I.D., (paragraph 11), The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor. The grid emissions factor (EFy) is calculated as the Combined Margin (CM) emissioon factor, 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.

[9] CO_2 emissions from combustion of fossil fuels for electricity generation

This part refers to the "Annex 27; Guidelines on the Demonstration of Additionality of Small-Scale Project Activities" (Version 09.0).

According to this guideline, "… the Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;

(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher."

We will demonstrate here that the project activity have financial barriers; a financially more viable alternative to the project activity would have led to higher emissions. This alternative is not to invest on this project and supply of the same amount of electricity by the Turkish Electricity Grid.

Therefore, it will be demonstrated that "the proposed project activity is not the most economically and financially viable" option without the VER revenue.

I- Determine appropriate analysis method

There are three options for investment analysis method:

1) Simple Cost Analysis
2) Investment Comparison Analysis and
3) Benchmark Analysis

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

Option 3-Applying benchmark analysis

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

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

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

The Tool for the Demonstration and Assessment of Additionality Version 6.0.0 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[10], provides the default values for the expected return on equity as an appendix, and Moody's index values of most of the CDM Countries. Turkey's Moody's index (Ba2) is comparable to country's with the same Moody's index such as Armenia, from this point of view a rreasonable and appropriate benchmark to compare the Equity IRR can be taken as 12.50 %.

II - Calculation and comparison of financial indicators

The following parameters are taken into account for the assessment of the investment (Table 4) and supplementary parameters are provided in the "AkbasHPPFinancialAnalysis" workbook and submitted to the validating DOE.

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

Parameter	Value	Unit	References
Installed Capacity	12,257	MWe	Production Licence
Expected Annual Electricity Generation	45,520	MWh	FSR page 1-2
Expected Annual Emission Reduction(ER)	24,574	tCO_2e	Calculated (see Chapter 3 for details)
Expected VCS-SCS-VCU sales price	7.00	USD/t CO_2e	State of the Voluntary Markets 2010[11]
Total Investment	30,174,108	USD	Based on FSR Report table 8.B.2
Annual Operation Costs	858,013.89	USD	Judgement based on experience gained in similar projects detailed references are provided to the validating DOE.

[10] Annex 5 Guidelines on The Assessment of Investment Analysis (Version 05)

[11] Hamilton, K., Sjardin, M., Peters-Stanley, M., and Marcello, T., 2010, Building Bridges: State of the Voluntary Carbon Markets 2010;A Report by Ecosystem Marketplace &Bloomberg New Energy Finance, June 14, 2010.

Loan	15,950,000	USD	Loan term sheet
Loan Period	11	years	Loan term sheet
Electricity Sales Price	0.085	USD/KWh	EMRA report for year 2010 p.64 (See Figure 5-4)
VAT	18	%	V.A.T. Law No:3065
Income Tax	20	%	Income Tax Law number 5281

The value of the investment has been depreciated on a reducing balance basis over 20 years. And 70 % of the long lasting assets are depreciated over 45 years. The economic life time of a hydro power plant investment is assumed to be about 50 years, based on the experts' committee report[12] 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[13]. Yet, we have conducted the financial analysis for a time frame of 45 years.

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 9.54 %, which is below the benchmark of 12.50%.

III - 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 5) 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 4).

Table 6: Sensitivity analysis for the Equity IRR without carbon revenue for the project (Benchmark: 12.50%)

Change	-10%	-5%	5%	10%	Exceed Benchmark?
Investment Cost	11.5%	10.4%	8.8%	8.1%	**No**
Operating Cost	9.9%	9.7%	9.4%	9.2%	**No**
Electricity Revenue	7.9%	8.7%	10.3%	11.2%	**No**

[12] http://ekutup.dpt.gov.tr/enerji/oik585.pdf page 4.25 (Last visited on 3/3/2011)
[13] http://ekutup.dpt.gov.tr/enerji/oik585.pdf page 4.26 (Last visited on 3/3/2011)

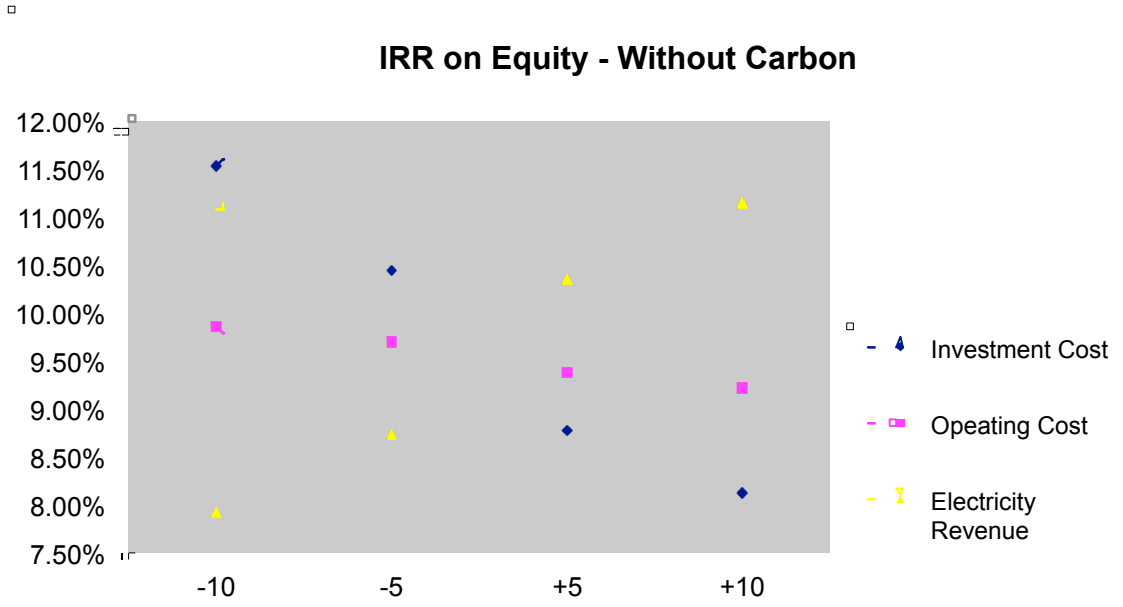

Figure 4: Sensitivity analysis: Fluctuation of the Equity IRR without the carbon revenue, by changing major parameters that effect the Equity IRR by ±10%

To exceed the benchmark, the electricity revenue must increase by about 18.40 % over the life of the project, or the investment cost must be reduced by about 13.65%. As the Renewable energy law only guaranties a minimum price of USD 0.073 per kWh, the price of 0.085 USD per kWh, we have chosen for our financial analysis is already very high for such an increase in the future, the former is unlikely. As the feasibility report considers the firm and secondary energy to be produced based on the available water flow data of the last 50 years, and 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 of 18.40%. 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 predicted energy production values. In addition to this if the other irrigation and energy projects will be developed at the upstream of the proposed project activity the electricity production will go further down to 26,910 MWh per year which is nearly 40 % less than that of the predicted amount at the actual case. The investment costs we have considered in our financial analysis are reasonable and reflect the average market conditions but are unlikely to go down.

Outcome:

Without the VER revenue the Internal Rate of Return of the project can not get close to the benchmark of 12.50 %, with an equity internal rate of return of 9.54%. A fluctuation of ± 10% in the key parameters also does not make the project exceed the benchmark.

Other- Barriers 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 Akbas HPP Project activity.

2.6 Methodology Deviations

The UNFCCC methodology of AMS-I.D, version 17 (EB 61, 3 June 2011), 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 of AMS-I.D, version 17 (EB 61, 3 June 2011), and the tool to calculate the emission factor for electricity system (Version 0EB 63, Annex 191), since the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

> The baseline scenario is that the 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 into the grid.

The Project therefore applies the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" ver 02.2.1 (EB63) as follows:

Step 1 -*Identify the relevant electric power system*

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 offical 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 5):

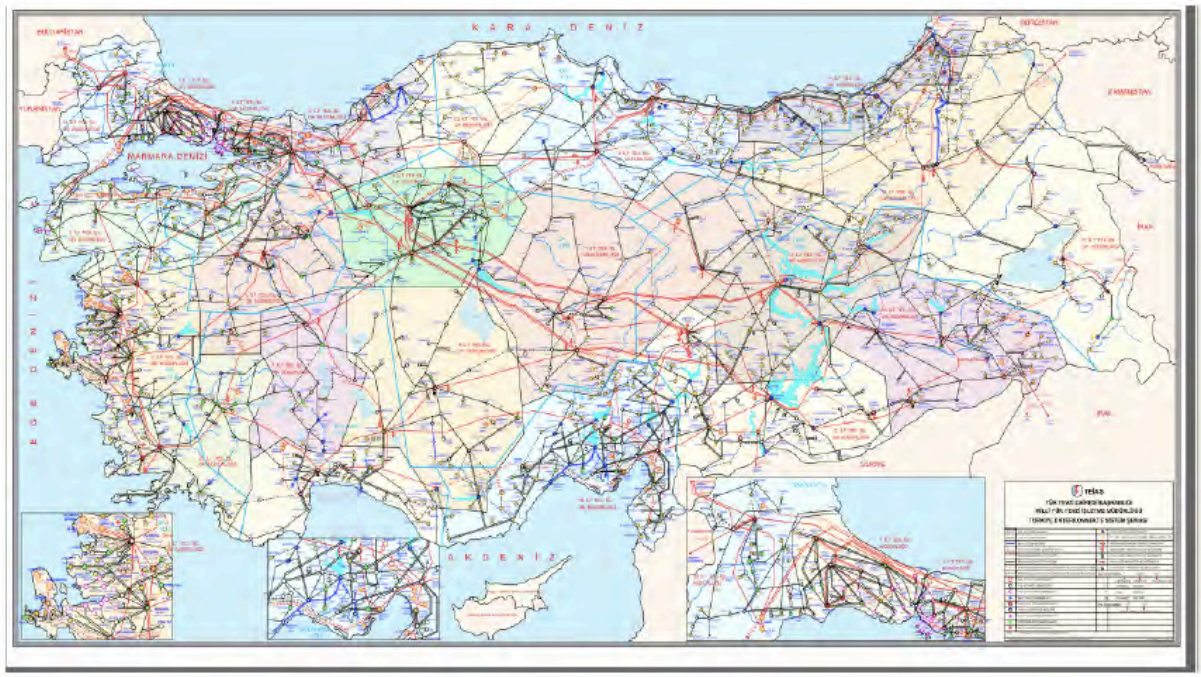

Figure 5: The Map showing the boundaries of Turkish Electricity Grid (Source Electricity Market Report 2010, by Electricity Market Regulatory Authority http://www.epdk.gov.tr/documents/10157/48dd12d4-74da-4dcf-9f48-86983146c0d8)

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

For the purpose of determining the operating margin emission factor, the tool directs us to use one of the following options to determine the CO_2 emission factor(s) for net electricity imports from a connected electricity system:

0 tCO_2/MWh; or (a) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 (d) below; or(b) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 (a), if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or (c) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 (b) below.

For imports from connected electricity systems located in Annex I country(ies), the emission factor is 0 tons 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 02.2.1 in calculating the Operating Margin grid emission factor for a given year y (EFgrid,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 7), therefore, in accordance with the Tool, (a) Simple OM method will be used in the calculations.

Table 7: **Share of primary sources in electricity generation, 2006 – 2010**[14]

	2006	**2007**	**2008**	**2009**	**2010**
Thermal	74.78 %	81.02 %	82.72 %	80.5 %	73.78 %
Hydro	25.10 %	18.72 %	16.77 %	18.46 %	24.52 %
Wind & Geothermal	0.12 %	0.26 %	0.51 %	0.99 %	1.70 %
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 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

[14] Annual Development of Installed Capacity Generation in Turkey (1970-2010) (http://www.teias.gov.tr/istatistik2010/front%20page%202010-çiçek%20kitap/kgucunkullanım(13-21)/13.xls)

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 2008, 2009 and 2010. 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 plant / unit and a CO_2 emission factor of each power unit, both of which are not publicly available, for the Turkish electricity grid.

[15] Fuel Consumed in thermal P.P.in Turkey by the Electric Utilities (2008-2010) (http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/47.xls)
[16] Heating Values Of Fuels Consumed In Thermal P.Ps In Turkey By The Electric Utilities (2008-2010), (http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/49.xls).
[17] Turkey's Gross Electricity Generation by Primary Energy Resources and The Electric Utilities (2008-2010) / (http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/47.xls)/ Annual Development of Electricity Generation-Consumption and Losses in Turkey (1984-2009), (http://www.teias.gov.tr/istatistik2009/30(84-09).xls).

$EF_{grid,OMsimple,y}$, 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 volumeunit)

$EF_{CO2,i,y}$ = 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.

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:

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

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)

m = Power units included in the build margin

y = Most recent historical year for which electricity generation data is available

According to the tool, the 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 14). 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 2009 and 2010. as explained in the part where the actual calculations are shown, the assessed capacities added in these two years constitutes our SET_{sample}.

Step 6 - 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)

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:"

The project capacity is: 12,257,000 W (As indicated on the EMRA issued Project License)

The Project's reservoir area is : 6,980.00 m^2 (As shown on the weir area coverage map given in Annex 4)

The Project Activity's power density calculates:

$$\frac{12{,}257{,}000\ W}{6{,}980\ m^2} = 1{,}756\ {}^{W}/_{m^2}$$

The project has a power density of 1,756 W/m^2 therefore:

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

Where:

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

In addition to this since there is going to be 1 auxiliary diesel generator, the emissions resulting from the occasional use of this generator is going to be calculated based on the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 02).

The project activity will be installing a diesel generator that will be consuming 216 gr of Diesel fuel /kWh[18] of electricity. Based on our expert view a hydro power plant does only need the support of such an emergency generator to produce electricity only for 1200 kWh per year, accordingly the emissions related to this amount is calculated to be under 1 $tCO_{2e,}$ and can be round up to 1 tCO2e. Details of this calculation is shown in the following Box (Box 1).

Box 1: Calculation of Diesel gas related emissions assuming 1200 kWh/year electricity production by diesel generator at 100% of load (based on the project activity diesel generators' specifications).

Parameter	**Value**	**Unit**
Maximum load factor	100%	
Amount of electricity possible to produce by the Emergency DG	1200	kWh
Diesel consumption per kWh	0.216	kg
Total Diesel consumption during one year	259.200	kg
Calculating Emissions due to diesel consumption :		
• PE = (FDy) × NCV_{diesel} x $COEF_{diesel}$ • PE: Project emissions from diesel generator (tCO_{2e}) • FD_y : Annual diesel fuel consumption (kg) • NCVdiesel: Net Calorific Value for diesel oil (TJ/m^3) • COEFdiesel: CO_2 emission coefficient for diesel oil (tCO_2/TJ)		
Fuel in Gigagrams:	0.0002592	Gg
$EF_{CO2,i,y}$	74,800[19]	$kgCO_2/TJ$
$NCV_{i,y}$:	43.3[20]	TJ/Gg
$COEF_{i,y}$ (EFXNCV)	3,238,840	$kgCO_2/Gg$
PE=COEFXFuel in Gigagrams	839.507	kgCO2
(round up)PE=	1	tCO2

[18] Based on the technical specifications of a Volvo Penta Genset Engine TAD 532 GE that is planned to be installed at the project site, to supply emergency or back-up electricity.
[19] IPCC default values at the upper 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
[20] IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

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 2008, 2009 and 2010. 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 8).

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 8: Net Calorific Values for each fuel type for Turkey

Fuel Type	NCV (TJ/kt)		
	2008	2009	2010
Hard Coal+ Imported Coal	22.24	22.21	22.32
Lignite	6.83	6.43	7.13
Fuel Oil	39.70	39.81	40.23
Diesel Oil	42.38	42.37	43.09
LPG	0	46.47	0
Naphtha	44.61	43.65	33.50
Natural Gas	36.63	37.17	37.38

The emission factors of fuels required are taken from IPCC 2006 guidelines for GHG inventories[21]. All data used for the calculations can be found in Annex-2 (See Table 1 and Table 2 to in Annex -2). Table 9 shows total CO_2 emission by fuel types calculated using lower IPCC emission factors and available data from the TEİAŞ website.

[21] 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 9: Calculation of emission by electricity generation (2008-2010)

	Default CO_2 Emissions (tCO_2)		
	2008	2009	2010
Hard Coal+Imported Coal	12,942,102.18	13,649,138.82	15,365,199.79
Lignite	41,189,044.65	37,164,240.90	36,745,389.26
Fuel Oil	6,513,942.76	4,792,096.57	2,708,730.18
Diesel Oil	403,661.11	556,318.57	63,674.50
Lpg	0.00	317.74	0.00
Naphtha	32,786.41	24,429.94	30,502.68
Natural Gas	42,980,830.92	42,346,272.06	44,215,362.69
TOTAL	104,062,368.04	98,532,814.60	99,128,859.11

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 10.

Table 10: Net Electricity Generation from thermal power plants (units in GWh)

	2008	**2009**	**2010**
		Unit: GWh	
Net Generation	189,761.90	186,619.30	203,046.10
Gross Generation	198,418.00	194,812.90	211,207.70
Net/Gross Ratio	0.9563744	0.9579412	0.9613575
Net Thermal Generation	156,978.63	150,323.43	149,806.03
Electricity Imports	789.40	812.00	1,143.80
***EG_y* (GWh)**	157,768.03	151,135.43	150,949.83
***EG_y* (MWh)**	157,768,028.11	151,135,428.72	150,949,827.21

The OM Emission Factor for the years 2008, 2009 and 2010 are calculated by dividing the total CO_2 emissions for those years (Table 09) to the Net Electricity Generation (Table 10) for the subject year. The annual OM emission factors are calculated as follows (Table 11):

Table 11: Annual OM Emission Factors

Year	OM Emission Factor
2008	0.65959
2009	0.65195
2010	0.65670

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

$EF_{grid,OMsimple}$ = 0.65613

Build Margin (BM)

As mentioned above we have prefered 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.

Between the $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$, the sample group that comprises the larger annual generation is $SET_{\geq 20\%}$, hence the set of capacity additions in the electricity system that comprise 20% of the system generation is used.

The amount of electricity produced by the $SET_{5\text{-units}}$ is calculated to be 4,288.65 GWh.

The gross electricity generation in year 2010 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 2010 was 211,207.70 GWh (See Table 10) in 2010, out of this amount 7,053.40 GWh was identifed[22] to be produced by projects that claimed VERs, excluding this number from the

[22] A list of units providing electricty to the year 2010 Turkish Electricity Grid is provided as an Annex 1 to the most recent Capacity Projection report published by TEIAS (http://212.175.131.171/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf). We have checked and identified the ones that have claimed VERs by comparing the list to the Gold Standard registry (https://gs2.apx.com/myModule/rpt/myrpt.asp?r=111) and VCS Project Database (http://www.vcsprojectdatabase.org). This list is provided to the validating DOE.

Net generation we end up with 195,992.70 GWh of electricity which is our AEG_{TOTAL} and 20% of that amount is calculated as 39,198.54 GWh.

Comparing the $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$, it is seen that $SET_{\geq 20\%}$, is higher than $SET_{5\text{-units}}$.

Therefore the $AEG_{SET\text{-}\geq 20\%}$ value of 39,198.54 GWh is to be compared to the capacity additions in the recent years.

Summing up electricity the generations of all the plants added to the Turkish National Grid in 2010 and 2009, but excluding the projects that claimed VERs, their total generation is 47,745.76 GWh. The total generation by the power plants added in year 2010 is 26,256.04 GWh which is still less than the $AEG_{SET\text{-}\geq 20\%}$ value of 39,198.54 GWh, however we are unable to identify the date of addition of the units that are added to the Grid in year 2009 to complete the amount of electricity added to the Grid by year 2010 power plants. Therefore, with a conservative approach we are considering all the units added in year 2009 and the $AEG_{SET\ Sample}$ value we are using in our BM calculation is, 47,745.76 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 2010, and 2009 are available as Annex-2 to the capacity projection reports published in the TEIAS web page. Also the annual generation capacity data for each plant is not available on the statistics page of TEİAŞ. The data for the years 2009[23] and 2010[24] 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 could 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 calculated for the second crediting period will be used. This option does not require monitoring the emission factor during the crediting period.

[23] TEİAŞ Capacity Projection Report 20010-2019 (http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf)
[24] http://www.teias.gov.tr/projeksiyon/KapasiteProjeksiyonu2011.doc

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 02.2.1) (EB 63 Report Annex 19) is utilised, in a very conservative manner, considering that we are unable to differentiate the units that were commissioned before year 2000, and we cannot differentiate their technologies, all the coal and lignite fired thermal power plants are considered to operate with 50% efficiency, all the oil fired power plants are considered to operate with 46% efficiency, and all the Natural Gas fired power plants are considered to operate at 60 % efficiency. For the diesel powered thermal power plants the efficiency is considered to be 45%. Since the default values are not provided for Naphtha, it is considered to behave like oil and its efficiency is considered as 46%, and Bitumen is considered to behave like coal and its efficiency is considered to be 50%. The efficiency values considered in BM calculations can be summarized as follows (Table 12):

Table 12: Default Electric efficiency rates taken from Annex 1 of the Methodological Tool to calculate the emission factor for an electricity system (Version 02.2.1) (EB 63 Report Annex 19).

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 13 below:

For the other fuel efficiencies the maximum efficiency of the other utilities have been used.

Table 13: Calculation of EF_{EL} generation efficiency based on the availble data of the host country.

	EF (tCO_2/TJ)	(EF*3.6)	Generation Efficiency % ($\eta_{m,y}$)	$EF_{EL,m,y}$ tCO_2/MWh
Coal	92.80	334.080	50.0 %	0.668
Lignite	90.90	327.240	50.0%	0.654

	EF (tCO_2/TJ)	(EF*3.6)	Generation Efficiency % ($\eta_{m,y}$)	$EF_{EL,m,y}$ tCO_2/MWh
Fuel Oil	75.50	271.800	46.0%	0.591
Diesel	72.60	261.360	46.0%	0.568
Naphtha	69.30	249.480	46.0%	0.542
Natural Gas	54.30	195.480	60.0%	0.326
Bitumen	73.00	262.800	50.0%	0.526

The 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 14). The emission factor has been taken as "zero" for the renewable and wastes and the generation efficiencies for the thermal power plants type (such as Bitumen) of which are not known are taken same as the best efficiency factor of the known units, which is generation efficiency for the 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.

Table 14 Annual CO_2 Emissions for Capacity Additions and Annual BM Emission Factors

Capacity Additions in 2009 (GWh)		CO_2 Emissions	$EF_{grid,BM,2009}$
Asphaltite	945.00	496.69	
Fuel Oil	1,082.08	639.37	
Coal	1,923.33	1,285.09	
Lignite	7.00	4.58	
Natural Gas	16,512.65	5,379.82	
Renewables and Wastes	1,019.66	0.00	
TOTAL	**21,489.72**	**7,805.56**	**0.36322**
Capacity Additions in 2010 (GWh)	CO_2 Emissions	$EF_{grid,BM,2008}$	
Coal	12017.6	4.1.1 8,029.71	
Lignite	180.0	.4.1.2 117.81	
Natural Gas	13108.5	4,270.76	
Renewables and Wastes	949.9	3.4.1.3 0.00	
TOTAL	**26,256.04**	**.1.4 12,418.28**	**0.47297**

The Build Margin Emission Factor of the grid is then calculated as a generation weighted average for the years 2009 and 2010. The resulting BM Grid is:

$EF_{grid,BM}$ = 0.42357 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;

$EF_y = 0.50 * 0.65613\ tCO_{2e}/MWh + 0.50 * 0.42357\ tCO_{2e}/MWh = 0.53985\ tCO_{2e}/MWh$

Emission reductions

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

$= 45{,}520\ MWh * 0.53985\ tCO_{2e}/MWh = 24{,}574\ tCO_{2e}$

A summary of the GHG removals by the project activity is given as follows (Table 15):

Table 15: summary of the GHG removals by the project activity

Years	Estimated baseline emissions or removals (tCO_{2e})	Estimated project emissions or removals (tCO_{2e}) (Due to diesel consumption)	Estimated leakage emissions (tCO_{2e})	Estimated net GHG emission reductions or removals (tCO_{2e})
Year 0: 2014 (August 3rd to Dec. 31st)	10,166	1	0	10,165
Year 1: 2015	24,574	1	0	24,573
Year 2: 2016	24,574	1	0	24,573
Year 3: 2017	24,574	1	0	24,573
Year 4: 2018	24,574	1	0	24,573
Year 5: 2019	24,574	1	0	24,573
Year 6: 2020	24,574	1	0	24,573
Year 7: 2021	24,574	1	0	24,573
Year 8: 2022	24,574	1	0	24,573
Year 9: 2023	24,574	1	0	24,573
Year 10: 2024 (January 1st to August 2nd)	14,408	1	0	14,407
Total	245,740	11	0	245,729

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, 2008, 2009, 2010.
Source of data:	Official publications at the Turkish Electricity Transmission Company (TEIAŞ) Web Site (http://www.teias.gov.tr/istatistik2010/front%20page%202010-çiçek%20kitap/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* 2008, 2009 and 2010
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/istatistik2010/front%20page%202010-çiçek%20kitap/yakıt46-49/49.xls http://www.teias.gov.tr/istatistik2010/front%20page%202010-çiçek%20kitap/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-1b
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 02.2.1 , 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/istatistik2010/front%20page%202010-çiçek%20kitap/uretim%20tuketim(22-45)/40(06-10).xls www.teias.gov.tr/istatistik2009/30(84-09).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	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The

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 $EF_{grid,OM,Simple,y}$

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 2008[25], 2009[26] and 2010[27].
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 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 $EF_{grid,BM,y}$

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 02.2.1)" 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 02.2.1)"
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
Data / Parameter:	NCVi,y

[25] http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf
[26] http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf
[27] http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf

Data unit:	GJ per mass or volume unit (GJ/ton)
Description:	Weighted average net calorific value of fuel type i in year y
Measured /Calculated /Default:	Default
Source of data:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) of monitored parameter:	43.3 GJ/ton
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Data will be used for Project Emission Calculations. The project emissions are those that are related to the burning of the diesel (fossil fuel) in the auxiliary power generators that produce electricity in the absence of the electricity obtained from the grid for self consumption.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Default values are used
Measuring/ Reading/ Recording frequency:	Default IPCC value is used. Any future revision of the IPCC Guidelines will be taken into account
Calculation method (if applicable):	Not Applicable as default value of the IPCC guidelines is utilized
QA/QC procedures applied:	Not Applicable as default value of the IPCC guidelines is utilized
Comments	Applicable as option B of the Methodological tool "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 02) is chosen.

4.2 Data and Parameters Monitored

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

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 two 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[28].
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, reported monthly on TEIAS Meter

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

	Reading Protocols, Reported annually on the VCS Monitoring Report.
Value applied:	Will be determined at the monitoring stage
Monitoring equipment:	Two Main Electricity Meter (Elster A 1500) Two Back-up Electricity Meter (Elster A 1500) Both meters will be in compliance with the communiqué for Metering Devices to be used in the Electricity Market[29]. 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 two main TEIAS meters recorded at the monthly reading protocols, the column related to gross electricity supplied to the Grid. The two main meters will be Elster A 1500:. The secondary source of data will be the PMUM/MFRC web site screen shots, the column with the heading ISVM[30].
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, reported monthly on TEIAS Meter Reading Protocols, Reported annually on the VCS Monitoring Report.
Value applied:	Will be determined at the monitoring stage
Monitoring equipment:	Two main electricity meter Two back-up electricity meter All meters will be in compliance with the communiqué for Metering Devices to be used in the Electricity Market[31]. They have an accuracy class of Class 002 indicating an accuracy

[29] 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
[30] ISVM: İletim Sistemine Veriş Miktarı-Amount Supplied to the Grid
[31] 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

	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 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:	12,257,000
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 topographic map presented in Annex 4.
Source of data:	Topographic map showing the project activity stuructures
Description of measurement methods and procedures to be applied:	The reservoir area corresponding to maximum operational level has been determined via a topographic map, presented in Annex 4.
Frequency of monitoring/recording:	Once during each monitoring period
Value applied:	6,980
Monitoring equipment:	-
QA/QC procedures to be applied:	Can be checked and compared to satellite imagery available by Google Earth.

Calculation method:	Measured over a topographic map
Any comment:	-

Data unit:	$PE_{FC,j,y}$
Description:	tCO_2/yr
Measured /Calculated /Default:	CO_2 emissions from fossil fuel combustion in process *j* during the year *y*
Source of data:	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 2.00 EB 41 Report Annex 11)
Description of measurement methods and procedures to be applied:	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 2.00 EB 41 Report Annex 11)
Frequency of monitoring/recording:	Once at every monitoring period
Value applied:	-
Monitoring equipment:	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 2.00 EB 41 Report Annex 11)
QA/QC procedures to be applied:	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 2.00 EB 41 Report Annex 11)
Calculation method:	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 2.00 EB 41 Report Annex 11)
Any comment:	Used to determine Project Emissions related to use of auxiliary diesel generator at the power house of the project activity.

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or volume unit per year (tonne/yr)
Description:	Quantity of fuel type *i* combusted in process *j* during the year *y*
Measured /Calculated /Default:	Calculated
Source of data:	Onsite logs and measurements
Description of measurement methods and procedures to be applied:	N/A as option A is chosen
Frequency of monitoring/recording:	Once at every monitoring period
Value applied:	-
Monitoring equipment:	Site Manager's log book
QA/QC procedures to be applied:	Continuous
Calculation method:	Step 1: Determination of the amount of diesel fuel consumed in Liters: Option 1: **a)** The auxiliary diesel generator work hours are recorded precisely and the annual work hours are summed and conservatively round up to the nearest whole hour.

-

	b) The total hours multiplied by the diesel fuel consumption at 75% load factor as described in the facts sheet of the diesel generator that will be installed to the project site. Option 2: The Diesel fuel consumption is precisely recorded by the site manager in a log book (in Litres). Step 2: Conversion of litres to volume: The Mass is calculated based on the following formula: • M=dXV where : • M = Mass in kg, • d = the average density of diesel fuel (0.845 kg/L[32]) and • V is the Volume in litres The Mass in kg is converted to Tonnes by dividing into 1000.
Any comment:	Used for the calculation of Project Emissions related to use of auxiliary diesel generator.

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	GJ per mass or volume unit (GJ/ton)
Description:	Weighted average net calorific value of fuel type i in year y
Measured /Calculated /Default:	Default
Source of data:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Description of measurement methods and procedures to be applied:	Not Applicable as default value of the IPCC guidelines is utilized
Frequency of monitoring/recording:	Not Applicable as default value of the IPCC guidelines is utilized
Value applied:	43.3 GJ/ton (default value used for calculations-does not change throughout the crediting period)
Monitoring equipment:	Default IPCC value is used. Any future revision of the IPCC Guidelines will be taken into account
QA/QC procedures to be applied:	Not Applicable as default value of the IPCC guidelines is utilized
Calculation method:	Not Applicable as default value of the IPCC guidelines is utilized
Any comment:	Applicable as option B of the Methodological tool "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 02) is chosen.

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tCO_2/GJ
Description:	Weighted average CO_2 emission factor of fuel type *i* in year *y*

[32] The source of the fuel density is taken from the Tüpraş rafinery data that is producing the diesel sold in the project activity host country : http://www.tupras.com.tr/detailpage.en.php?strProductKey=403&lRedirectPageID=1621

Measured /Calculated /Default:	Default
Source of data:	IPCC default values at the upper 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
Description of measurement methods and procedures to be applied:	Not Applicable as default value of the IPCC guidelines is utilized
Frequency of monitoring/recording:	Not Applicable as default value of the IPCC guidelines is utilized
Value applied:	74.80 tCO_2/GJ (default value used for calculations-does not change throughout the monitoring period)
Monitoring equipment:	Default IPCC value is used. Any future revision of the IPCC Guidelines will be taken into account
QA/QC procedures to be applied:	Not Applicable as default value of the IPCC guidelines is utilized
Calculation method:	Not Applicable as default value of the IPCC guidelines is utilized
Any comment:	Applicable as option B of the Methodological tool "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 02) is chosen.

4.3 Description of the Monitoring Plan

The Monitoring Plan for the project consists mainly of the net electricity generation by the project activity. Based on the baseline scenario presented above, this amount of electricity would have been produced by the Turkish National Grid.

The electricity produced will be sold to TEİAŞ. Therefore, TEİAŞ measures the electricity produced by four meters:

1. Two main electricity meters
2. Two back-up electricity meters

These meters will be placed on the TEDAŞ metering cubicle 1 and 2, where the power plant gets connected to the Turkish national grid. Those meters will provide official data which will be read remotely or on site and recorded monthly by TEİAŞ officers for invoicing. TEİAŞ also conducts the calibration and maintenance of these meters and thus, ensures the accuracy and quality of the measurements. The quality standards that the meters need to comply is "The ICE/TSE 62053-22: Electricity metering equipment (a.c) – Particular requirements - Part 22: Static meters for active energy (Classes 0,2 S and 0,5 S)" The calibration of the meters is done and the meters will be checked continuously if there is a difference of 0.2 % in the readings of the main and the auxiliary meters, the calibration is repeated.

The net electricity produced ($EG_{PP\text{-}net,\ y}$) in year y is calculated by subtracting the total electricity consumed by the hydroelectric power plant ($EG_{PP\text{-}self\ consumption,\ y}$) , from the gross electricity

generation ($EG_{PP\text{-}gross,\ y}$) . After obtaining the net electricity production value, the emission reductions will be calculated by multiplying the net electricity with the Combined Margin calculated above.

In addition to the net generated electricity, the extent of the reservoir area, the amount of fossil fuel used to run the emergency/back up generator and the project's capacity will be monitored during each verification period.

The monitoring will be conducted by the Verified Emission Reduction (VER) Monitoring Team. The VER Team Members, and their position and duties for the monitoring is outlined in the following table (Table 15):

Table 16: Positions and responsibilities of the VER monitoring team members.

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

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

5 ENVIRONMENTAL IMPACT

As also stated in the Project Introductory File (PIF) report of the Akbas HPP, According to the items numbered 14 and 33 of the Annex-I of the "Environmental Impact Assessment (EIA) regulation" published in the official Gazette dated 16.12.2003 and numbered 25318 Akbas HPP was not enlisted amongst the project where an EIA needs to be implemented. However the project owners obtained

an ecosystem compliance report and have also got their Wetlands and EIA exemption Certificates, that concludes that the project has no or minimal impact over the environment. These certifications for the project are presented as Annex-3.

The following is the summary of the impacts and the mitigation actions outlined in the PIF Report approved by the local branch of the Ministry of Environment and Urban Planning:

Air Quality: Air quality is expected to be effected especially during the construction period. The EIA report presents detailed NOx and PM distribution models that indicate that especially dust could be a problem in the nearby settlements. To avoid such problems, necessary precautions, such as spraying water to roads roads, careful loading and unloading and covering the top of loaded trucks by tarpaulin; will be taken in order to minimize the dust formed during excavation. During the operation phase these impacts will be minimized and vanished in time as the landscaping and tree planting activities that will be made during the first years of the operation will finish.

Water & Wastewater Management: Both during the construction and operation stages, water for domestic use will be supplied by tankers to the site and wastewater will be collected in septic tanks which will be emptied regularly. The wastewater will be discharged in accordance with Water Pollution Control Regulations, will be sent to the nearest waste water treatment facility.

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

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

Biodiversity: The project will be effecting the surrounding flora and fauna especially during the construction phase. To minimize this effect the top soil will be used to create new habitats for plant life around the work site. In addition to this to avoid potential land slides and to support local flora, the project area and its surrounding will be planted and forested in close collaboration with the local forest authority. In addition to the impact to the plant and terrestrial animal life, an other important impact of the project will be to the aquatic life, as the water will be diverted for about 3.65 km from its original course. To avoid any damage to the aquatic life the life line water that needs to be released to the river bed is determined to be in average 1.233 m^3/second. In addition to this to support the fish migration a fish passage that will have minimum 20 cm water depth and an average water flow rate of 0.6 m/s will be constructed at the Akbas Weir body.

PIF Report also summarizes the rules and regulations that the project has to comply with. These are also presented as Annex-1, to this document.

6 STAKEHOLDER COMMENTS

The project owner have organized a stake holders meetings within the framework of the Expropriation process. The Meeting was communicated to the village heads and was announced in the village.

The meting was held in the winter of 2010-11.

The villagers attended the meeting and they were informed about the project and about the expropriation process. Below are some pictures from this meeting:

Figure 6: Some Snapshots from the meeting held at the project location

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

Turkish Environmental Legislation

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

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

- Environmental Impact Assessment Regulation, Official Gazette No. 26939 dated July 17, 2008.
- Water Pollution Control Regulation, Official Gazette No. 25687 dated December 31, 2004 and revised in Official Gazette No. 26786 dated February 13, 2008;
- Regulation on Construction of Cesspits where there is no Wastewater Collection System, Official Gazette No. 13783 dated March 13, 1971;
- Hazardous Chemicals Regulation, Official Gazette No.21634 dated July 11, 1993 and revised in Official Gazette No. 27092 dated December 26, 2008;
- Regulation on General Principles of Waste Management, Official Gazette No. 26927 dated July 5, 2008;
- Hazardous Wastes Control Regulation, Official Gazette No. 25755 dated March 14, 2005;
- Waste Oil Control Regulation, Official Gazette No. 26952 dated July 30, 2008 and revised Official Gazette No. 27304 dated July 31, 2009;
- Vegetative Waste Oil Control Regulation, Official Gazette No. 25791 dated April 19, 2005; and revised Official Gazette No. 27305 dated July 31, 2009
- Solid Waste Control Regulation, Official Gazette No. 20814 dated March 14, 1991 and revised in Official Gazette No. 25777 dated April 5, 2005;

- Medical Waste Control Regulation, Official Gazette No. 25883 dated July 22, 2005;
- Environmental Audit Regulation, Official Gazette No. 27061 dated November 21, 2008;
- Packaging Waste Control Regulation, Official Gazette No. 26562 dated June 24, 2007 and revised in Official Gazette No. 27046 dated November 6, 2008; and
- Waste Batteries and Accumulators Control Regulation, Official Gazette No. 25569 dated August 31, 2004 and revised in Official Gazette No. 25744 dated March 03, 2005;
- The Excavation, Construction and Demolition Waste Control Regulation, Official Gazette No. 25406 dated March 18, 2004;
- Soil Pollution Control Regulation, Official Gazette No. 25831 dated May 31, 2005;
- Regulation Related to Workplace Opening and Operation Permits, Official Gazette No. 25902 dated August 10, 2005 and revised in Official Gazette No. 26492 dated April 13, 2007;
- Industrial Air Pollution Control Regulation, Official Gazette No.27277 dated July 3, 2009
- Air Quality Assessment and Management Regulation, Official Gazette No. 26898 dated June 6, 2008 and revised in Official Gazette No. 27219 and dated May 5, 2009;
- Air Pollution Control Regulation For Heating Sources, Official Gazette No. 25699 dated January 13, 2005 and revised in Official Gazette No. 27134 dated February 07, 2009;
- Exhaust Gases Emission Control Regulation, Official Gazette No. 27190 dated April 04, 2009; and
- Regulation on Protection of Wetlands, Official Gazette No. 25818 dated May 17, 2005.
- In addition to the Environmental Law and its associated regulations, there are several other laws that directly or indirectly include environmental review, and thus, are applicable to the proposed project. The project will comply with the 4857 numbered Labour Law and its regulations stated below:
- 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/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/47.xls

TÜRKİYE TERMİK SANTRALLARINDA KULLANILAN YAKIT MİKTARLARININ ÜRETİCİ KURULUŞLARA DAĞILIMI
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)
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

			2008	2009	2010
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	Taşkömürü	*Hard Coal*	1,636,566	1,664,859	1,563,792
	Linyit	*Lignite*	60,284,929	57,850,129	50,123,941
	TOPLAM	*TOTAL*	**61,921,495**	**59,514,988**	**51,687,733**
	Fuel-Oil *Fuel Oil*	Asıl Yakıt *Main Fuel*	832,635	239,410	16,864
		Yrd. Yakıt *Auxiliary Fuel*	154,307	134,007	105,073
		TOPLAM *TOTAL*	**986,942**	**373,417**	**121,937**
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	0	45,364	4
		Yrd. Yakıt *Auxiliary Fuel*	83,041	72,956	18,901
		TOPLAM *TOTAL*	**83,041**	**118,320**	**18,905**
	TOPLAM	*TOTAL*	**1,069,983**	**491,737**	**140,842**
	Doğal Gaz	*Natural Gas*	5,789,269	5,091,011	4,493,275
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	Fuel-Oil	*Fuel Oil*	67,762	0	0
	Motorin	*Diesel Oil*	0	0	0
	TOPLAM	*TOTAL*	**67,762**	**0**	**0**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	4,633,442	4,956,318	5,855,911
	Linyit	*Lignite*	6,089,191	5,770,389	6,565,451
	TOPLAM	*TOTAL*	**10,722,633**	**10,726,707**	**12,421,362**
	Fuel-Oil	*Fuel Oil*	1,118,667	1,220,904	769,845
	Motorin	*Diesel Oil*	48,165	62,537	1,449
	LPG	*LPG*	0	111	0
	Nafta	*Naphta*	10,606	8,077	13,140
	TOPLAM	*TOTAL*	**1,177,438**	**1,291,629**	**784,434**
	Doğal Gaz	*Natural Gas*	15,818,366	15,887,029	17,290,139
TÜRKİYE *TURKEY*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	6,270,008	6,621,177	7,419,703
	Linyit	*Lignite*	66,374,120	63,620,518	56,689,392
	TOPLAM	*TOTAL*	**72,644,128**	**70,241,695**	**64,109,095**
	Fuel-Oil	*Fuel Oil*	2,173,371	1,594,321	891,782
	Motorin	*Diesel Oil*	131,206	180,857	20,354
	LPG	*LPG*	0	111	0
	Nafta	*Naphta*	10,606	8,077	13,140
	TOPLAM	*TOTAL*	**2,315,183**	**1,783,366**	**925,276**
	Doğal Gaz	*Natural Gas*	**21,607,635**	**20,978,040**	**21,783,414**

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.
*

http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/47.xls

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

http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/49.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

			2008	2009	2010
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	Taşkömürü	*Hard Coal*	5,514	5,452	4,990
	Linyit	*Lignite*	94,045	83,356	80,967
	TOPLAM	*Total*	**99,559**	**88,809**	**85,957**
	Fuel-Oil *Fuel Oil*	Asıl Yakıt *Main Fuel*	7,993	2,301	162
		Yrd. Yakıt *Auxiliary Fuel*	1,481	1,286	1,009
		TOPLAM *TOTAL*	**9,474**	**3,587**	**1,171**
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	0	467	0
		Yrd. Yakıt *Auxiliary Fuel*	855	751	195
		TOPLAM *TOTAL*	**855**	**1,219**	**195**
	TOPLAM	*TOTAL*	**10,329**	**4,806**	**1,366**
	Doğal Gaz	*Natural Gas*	**47,744**	**42,335**	**37,354**
	TOPLAM	*TOTAL*	**157,632**	**135,949**	**124,676**
MOBİL SANTRALLAR *MOBIL POWER PLANTS*	Fuel-Oil	***Fuel Oil***	649	0	0
	Motorin	***Diesel Oil***			
	TOPLAM	***TOTAL***	**649**	**0**	**0**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	27,796	29,677	34,556
	Linyit	*Lignite*	14,182	14,295	15,584
	TOPLAM	*Total*	**41,978**	**43,973**	**50,141**
	Fuel-Oil	*Fuel Oil*	10,484	11,573	7,398
	Motorin	*Diesel Oil*	473	612	15
	Lpg	*Lpg*	0	1	0
	Nafta	*Naphta*	113	84	105
	TOPLAM	*TOTAL*	**11,070**	**12,270**	**7,518**
	Doğal Gaz	*Natural Gas*	**141,313**	**143,931**	**157,134**
	TOPLAM	*TOTAL*	**183,291**	**187,904**	**207,275**
TÜRKİYE *TURKEY*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	33,310	35,130	39,546
	Linyit	*Lignite*	108,227	97,652	96,551
	TOPLAM	*Total*	**141,537**	**132,781**	**136,097**
	Fuel-Oil	*Fuel Oil*	20,607	15,160	8,569
	Motorin	*Diesel Oil*	1,328	1,830	209
	Lpg	*Lpg*	0	1	0
	Nafta	*Naphta*	113	84	105
	TOPLAM	*TOTAL*	**22,048**	**17,076**	**8,884**
	Doğal Gaz	*Natural Gas*	**189,057**	**186,266**	**194,487**
	TOPLAM	*TOTAL*	**352,642**	**336,123**	**339,468**

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.

Source: http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/49.xls

-

Table 4:

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

			2008	2009	2010
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	**Taşkömürü**	*Hard Coal*	23,086,015	22,828,163	20,892,383
	Linyit	*Lignite*	393,747,606	348,995,433	338,990,622
	TOPLAM	*Total*	**416,833,621**	**371,823,595**	**359,883,005**
	Fuel-Oil *Fuel Oil*	**Asıl Yakıt** *Main Fuel*	33,465,092	9,632,696	679,656
		Yrd. Yakıt *Auxiliary Fuel*	6,200,651	5,386,180	4,223,229
		TOPLAM *TOTAL*	**39,665,743**	**15,018,876**	**4,902,885**
	Motorin *Diesel Oil*	**Asıl Yakıt** *Main Fuel*	0	1,956,278	159
		Yrd. Yakıt *Auxiliary Fuel*	3,579,714	3,146,162	815,082
		TOPLAM *TOTAL*	**3,579,714**	**5,102,441**	**815,241**
	TOPLAM	*TOTAL*	**43,245,457**	**20,121,317**	**5,718,126**
	Doğal Gaz	*Natural Gas*	**199,894,579**	**177,247,713**	**156,392,061**
	TOPLAM	*TOTAL*	**659,973,658**	**569,192,626**	**521,993,192**
MOBİL SANTRALLAR *MOBIL POWER PLANTS*	**Fuel-Oil**	***Fuel Oil***	2,717,233	0	0
	Motorin	***Diesel Oil***	0	0	0
	TOPLAM	***TOTAL***	**2,717,233**	**0**	**0**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	116,376,293	124,253,075	144,680,890
	Linyit	*Lignite*	59,377,198	59,852,102	65,249,084
	TOPLAM	*Total*	**175,753,490**	**184,105,177**	**209,929,975**
	Fuel-Oil	*Fuel Oil*	43,894,411	48,452,601	30,974,336
	Motorin	*Diesel Oil*	1,980,356	2,560,350	61,818
	Lpg	*Lpg*	0	5,158	0
	Nafta	*Naphta*	473,108	352,524	440,154
	TOPLAM	*TOTAL*	**46,347,876**	**51,370,633**	**31,476,308**
	Doğal Gaz	*Natural Gas*	**591,649,268**	**602,609,967**	**657,887,178**
	TOPLAM	*TOTAL*	**767,402,759**	**786,715,144**	**867,817,153**
TÜRKİYE *TURKEY*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	139,462,308	147,081,237	165,573,274
	Linyit	*Lignite*	453,124,804	408,847,535	404,239,706
	TOPLAM	*Total*	**592,587,112**	**555,928,772**	**569,812,980**
	Fuel-Oil	*Fuel Oil*	86,277,388	63,471,478	35,877,221
	Motorin	*Diesel Oil*	5,560,070	7,662,790	877,059
	Lpg	*Lpg*	0	5,158	0
	Nafta	*Naphta*	473,108	352,524	440,154
	TOPLAM	*TOTAL*	**92,310,566**	**71,491,950**	**37,194,434**
	Doğal Gaz	*Natural Gas*	**791,543,848**	**779,857,681**	**814,279,239**
	TOPLAM	*TOTAL*	**1,476,441,526**	**1,407,278,403**	**1,421,286,653**

Source: Computed based on the data in p. 44.

Table-5

NET CALORIFIC VALUES OF FUELS CONSUMED IN THE THERMAL POWER PLANTS

Unit: TJ/KT

			2008	2009	2010
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	Taşkömürü	*Hard Coal*	14.11	13.71	13.36
	Linyit	*Lignite*	6.53	6.03	6.76
	TOPLAM	*TOTAL*	**6.73**	**6.25**	**6.96**
	Fuel-Oil *Fuel Oil*	Asıl Yakıt *Main Fuel*	40.19	40.24	40.30
		Yrd. Yakıt *Auxiliary Fuel*	40.18	40.19	40.19
		TOPLAM *TOTAL*	**40.19**	**40.22**	**40.21**
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	0.00	0.00	1.00
		Yrd. Yakıt *Auxiliary Fuel*	43.11	43.12	43.12
		TOPLAM *TOTAL*	**43.11**	**43.12**	**43.12**
	TOPLAM	*TOTAL*	**40.42**	**40.92**	**40.60**
	Doğal Gaz	*Natural Gas*	34.53	34.82	34.81
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	Fuel-Oil	*Fuel Oil*	40.10	0.00	0.00
	Motorin	*Diesel Oil*			
	TOPLAM	*TOTAL*	**40.10**	**0.00**	**0.00**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	25.12	25.07	24.71
	Linyit	*Lignite*	9.75	10.37	9.94
	TOPLAM	*TOTAL*	**16.39**	**17.16**	**16.90**
	Fuel-Oil	*Fuel Oil*	39.24	39.69	40.23
	Motorin	*Diesel Oil*	41.12	40.94	42.66
	LPG	*LPG*	0.00	0.00	1.00
	Nafta	*Naphta*	44.61	43.65	33.50
	TOPLAM	*TOTAL*	**39.36**	**39.77**	**40.13**
	Doğal Gaz	*Natural Gas*	37.40	37.93	38.05
TÜRKİYE *TURKEY*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	22.24	22.21	22.32
	Linyit	*Lignite*	6.83	6.43	7.13
	TOPLAM	*TOTAL*	**8.16**	**7.91**	**8.89**
	Fuel-Oil	*Fuel Oil*	39.70	39.81	40.23
	Motorin	*Diesel Oil*	42.38	42.37	43.09
	LPG	*LPG*	0.00	0.00	1.00
	Nafta	*Naphta*	44.61	43.65	33.50
	TOPLAM	*TOTAL*	**39.87**	**40.09**	**40.20**
	Doğal Gaz	*Natural Gas*	36.63	37.17	37.38

Computed based on the data in page 45

-

Table-6:

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*			2008	2009	2010
E	TAŞKÖMÜRÜ	*Hard Coal*	1,882.4	1,851.1	1,882.7
	LİNYİT	*Lignite*	22,433.3	22,395.3	20,646.7
	KÖMÜR TOPLAMI	*Coal Total*	**24,315.7**	**24,246.4**	**22,529.4**
Ü	FUEL-OİL	*Fuel Oil*	3,365.1	974.4	62.2
	MOTORİN	*Diesel oil*	0.4	0.2	0.0
A	SIVI TOPLAMI	*Liquid Total*	**3,365.5**	**974.6**	**62.2**
	DOĞAL GAZ	*Natural Gas*	**18,818.5**	**17,225.5**	**15,289.4**
Ş	TERMİK TOPLAM	*Thermal Total*	**46,499.7**	**42,446.5**	**37,881.0**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+Wind Total*	**28,419.4**	**28,338.2**	**41,377.4**
	TOPLAM	*Total*	**74,919.1**	**70,784.8**	**79,258.3**
BAĞLI ORTAKLIKLAR *Affiliated partnerships Of EÜAŞ*	LİNYİT	*Lignite*	14,802.7	11,974.5	10,524.2
	DOĞAL GAZ	*Natural Gas*	7,995.1	6,694.4	5,749.9
	TERMİK TOPLAM	*Thermal Total*	**22,797.8**	**18,668.9**	**16,274.1**
MOBİL SANTRALLAR *MOBILE P.P.*	FUEL-OİL	*Fuel Oil*	**330.5**	**0.0**	**0.0**
	MOTORİN	*Diesel oil*			**0.0**
	TERMİK TOPLAM	*Thermal Total*	**330.5**	**0.0**	**0.0**
OTOPRODÜKTÖRLER ÜRETİM ŞRK. İŞLETME HAKKI DEV. *Autoproducers Production Comp. TOOR*	TAŞKÖMÜRÜ+İTHAL KÖMÜR	*Hard Coal+Imported Coal*	13,975.1	14,744.5	17,221.6
	LİNYİT	*Lignite*	4,622.1	4,719.6	4,771.2
	KÖMÜR TOPLAMI	*Coal Total*	**18,597.2**	**19,464.1**	**21,992.8**
	FUEL-OİL	*Fuel Oil*	3,513.0	3,465.4	2,081.6
	MOTORİN	*Diesel oil*	265.9	345.6	4.3
	LPG	*LPG*	0.0	0.4	0.0
	NAFTA	*Naphtha*	43.6	17.6	31.9
	SIVI TOPLAMI	*Liquid Total*	**3,822.5**	**3,829.0**	**2,117.8**
	DOĞAL GAZ	*Natural Gas*	**71,871.7**	**72,174.8**	**77,104.5**
	YENİLENEBİLİR+ATIK	*Renewables and wastes*	**219.9**	**340.1**	**457.0**
	TERMİK TOPLAM	*Thermal Total*	**94,511.3**	**95,808.0**	**101,672.5**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+Wind Total*	**5,859.3**	**9,551.2**	**14,002.8**
	TOPLAM	*Total*	**100,370.6**	**105,359.2**	**115,675.3**
TÜRKİYE *TURKEY*	TAŞKÖMÜRÜ+İTHAL KÖMÜR	*Hard Coal+Imported Coal*	15,857.5	16,595.6	19,104.3
	LİNYİT	*Lignite*	41,858.1	39,089.5	35,942.1
	KÖMÜR TOPLAMI	*Coal Total*	**57,715.6**	**55,685.1**	**55,046.4**
	FUEL-OİL	*Fuel Oil*	7,208.6	4,439.8	2,143.8
	MOTORİN	*Diesel oil*	266.3	345.8	4.3
	LPG	*LPG*	0.0	0.4	0.0
	NAFTA	*Naphtha*	43.6	17.6	31.9
	SIVI TOPLAMI	*Liquid Total*	**7,518.5**	**4,803.5**	**2,180.0**
	DOĞAL GAZ	*Natural Gas*	**98,685.3**	**96,094.7**	**98,143.7**
	YENİLENEBİLİR+ATIK	*Renewables and wastes*	**219.9**	**340.1**	**457.5**
	TERMİK TOPLAM	*Thermal Total*	**164,139.3**	**156,923.4**	**155,827.6**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+Wind Total*	**34,278.7**	**37,889.5**	**55,380.1**
	TÜRKİYE TOPLAMI	*TURKEY'S TOTAL*	**198,418.0**	**194,812.9**	**211,207.7**

Table 7

TÜRKİYE ELEKTRİK ENERJİSİ ÜRETİM - TÜKETİM VE KAYIPLARININ YILLAR İTİBARİYLE GELİŞİMİ

ANNUAL DEVELOPMENT OF ELECTRICITY GENERATION- CONSUMPTION AND LOSSES IN TURKEY

(1984-2009)

http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2010/Kont%20page%202010-şiçak%20Alsp-ureti%20tuketim(22-45)/33(84-10).xls

YILLAR YEARS	BRÜT ÜRETİM GROSS GEN.	ARTIŞ % INCREASE	İÇ İHTİYAÇ INTERNAL 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	%	İHRACAT[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	6.9	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	8.0	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	10.9	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	9.4	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	9.3	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	9.5	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	9.0	6680.3	12.3	906.8	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	10.7	7561.2	13.2	506.4	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	12.1	8994.8	14.2	314.2	53984.7	9.5
1993	73807.5	9.6	3943.1	5.3	69864.4	212.9	70077.3	1634.9	2.3	8616.7	12.3	10251.6	14.6	588.7	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 *	13.6	11843.0	16.0	570.1	61400.9 *	3.7
1995	86247.4	10.1	4388.8	5.1	81858.6	0	81858.6	2034.9	2.5	11733.9 *	14.3	13768.8	16.8	695.9	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 *	14.8	15854.8	17.5	343.1	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 *	15.5	18581.9	18.4	271.0	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 *	16.0	20794.9	19.1	298.2	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 *	16.4	21545.0	19.1	285.3	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 *	16.8	23755.9	19.4	437.3	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 *	16.5	23328.7*	19.3	432.8	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 *	16.1	23931.9	18.8	435.1	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 *	15.2	24052.7	17.6	587.6	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 *	13.6	23243.0	16.0	1144.3	121141.9 *	8.4
2005	161956.2	7.5	6487.1	4.0	155469.1	635.9	156105.0	3696.3	2.4	20348.7 *	13.0	24044.0	15.4	1798.1	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 *	11.3	23789.2	14.0	2235.7	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 *	12.0	26646.6	14.5	2422.2	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 *	12.1	27481.5	14.4	1122.2	161947.6 *	4.4
2009	194812.9	-1.8	8193.6	4.2	186619.3	812.0	187431.3	3873.4	2.1	25018.0 *	13.3	28891.4	15.5	1545.8	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 *	12.0	30221.7	14.8	1917.6	172050.6 *	9.7

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 , 1984-2010

1) *Supplied to the Network = Net Generation+Import*

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

* *Source : Electricity Distribution and Consumption Statistics of Turkey , 1984-2010*

Table-8a:
Source: http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf

Plant Name	Electricity Utilities	Fuel Type	Installed Capacity (Mw)	Firm Generation Capacity (GWh)	VER Status
Silopi Elektrik Üretim A.Ş.	Prod.Comp.	Bitumen	135	945.00	
Habaş (Bilecik)(Paşalar)	Prod.Comp.	Fuel Oil	18	144.00	
Habaş (İzmir)(Habaş)	Prod.Comp.	Fuel Oil	36	288.00	
Hayat Kağit	Prod.Comp.	Fuel Oil	7.5	56.30	
Silopi Elektrik Üretim A.Ş.(Esenboğa)	Prod.Comp.	Fuel Oil	44.8	315.00	
Tire- Kutsan (Tire)	AutoProducer	Fuel Oil	8	37.00	
TÜPRAŞ O.A.RAFİNERİ(Kırıkkale)(Düzeltme)	AutoProducer	Fuel Oil	10	70.00	
Tüpraş Rafineri(Aliağa/İzmir)	AutoProducer	Fuel Oil	24.7	171.78	
İçdaş Çelik (İlave)	Prod.Comp.	İmported Coal	270	1,923.33	
Alkim Alkali Kimya (Cihanbeyli/Konya)	Autoproducer	Lignite	0.4	3.00	
Konya Şeker San. Tic. A.Ş.	Autoproducer	Lignite	1.6	4.00	
Ak Gida San. Ve Tic. A.Ş. (Pamukova)	Autoproducer	Natural Gas	7.5	61.00	
Aksa Akrilik Kimya Sn. A.Ş. (Yalova)	Prod.Comp.	Natural Gas	70	539.00	
Aksa Enerji (Antalya) (Güç Değişikliği)	Prod.Comp.	Natural Gas	16.2	127.72	
Aksa Enerji (Antalya) (İlave)	Prod.Comp.	Natural Gas	300	2310.00	
Aksa Enerji (Antalya) (İlave)	Prod.Comp.	Natural Gas	300	2310.00	
Aksa Enerji (Manisa) (İlave)	Prod.Comp.	Natural Gas	52.4	414.93	
Aksa Enerji (Manisa) (İlave)	Prod.Comp.	Natural Gas	10.5	83.14	
Anadolu Elektrik (Çakirlar Hes)	Prod.Comp.	Natural Gas	16.2	28.00	
Antalya Enerji (İlave)	Prod.Comp.	Natural Gas	41.8	302.10	
Arenko Elektrik Üretim A.Ş. (Denizli)	Prod.Comp.	Natural Gas	12	84.00	
Bil Enerji (Dg+M) (Balgat)	Prod.Comp.	Natural Gas	36.6	255.00	
Cam İş Elektrik (Mersin) (İlave)	Prod.Comp.	Natural Gas	126.1	1008.00	
Çelikler Taah. İnş. (Rixox Grand)	Autoproducer	Natural Gas	2	16.00	
Dalsan Alçi San. Ve Tic. A.Ş.	Autoproducer	Natural Gas	1.2	9.00	
Delta Enerji Üretim Ve Tic.A.Ş.	Prod.Comp.	Natural Gas	47	365.82	
DELTA ENERJİ ÜRETİM VE TİC.A.Ş. (ılave)	Prod.Comp.	Natural Gas	13	101.18	
DESA ENERJİ ELEKTRİK ÜRETİM A.Ġ.	Prod.Comp.	Natural Gas	9.8	70.00	
E.Şehir End. Enerji (Dg+M)(Eskişehir-2)	Prod.Comp.	Natural Gas	59	451.80	
Ege Birleşik Enerji (Lpg+Dg+M)(Aliağa)	Prod.Comp.	Natural Gas	12.8	107.00	
Entek Köseköy(İztek) (Düzeltme)	Prod.Comp.	Natural Gas	36.3	288.87	
Entek Köseköy(İztek) (Düzeltme)	Prod.Comp.	Natural Gas	0.8	6.37	
Erdemir(Ereğli-Zonguldak)	Prod.Comp.	Natural Gas	39.2	237.88	

Plant Name	Electricity Utilities	Fuel Type	Installed Capacity (Mw)	Firm Generation Capacity (GWh)	VER Status
Falez Elektrik Üretimi A. Ş.	Prod.Comp.	Natural Gas	11.7	88.00	
Global Enerji (Pelitlik)	Prod.Comp.	Natural Gas	8.6	155.00	
Gül Enerji Elkt. Üret. Sn. Ve Tic. A.Ġ.	Prod.Comp.	Natural Gas	24.3	170.00	
Habaş Aliağa	Prod.Comp.	Natural Gas	224.5	1796.00	
Kasar Dual Tekstil San. A.Ş. (Çorlu)	Autoproducer	Natural Gas	5.7	38.00	
Ken Kipaş Elektrik Üretim (Karen)	Prod.Comp.	Natural Gas	41.8	180.00	
Ken Kipaş Elektrik Üretim (Karen) (Kahramanmaraş)	Prod.Comp.	Natural Gas	17.5	75.36	
Maksi Enerji Elektrik Üretim A.Ş.	Prod.Comp.	Natural Gas	7.7	55.00	
Marmara Pamuklu Mens. Sn.Tic.A.Ş.	Prod.Comp.	Natural Gas	34.9	275.15	
Mauri Maya San. A.Ş.	Autoproducer	Natural Gas	2.3	20.00	
Modern Enerji (B.Karıştıran)	Prod.Comp.	Natural Gas	96.8	680.00	
Mosb Enerji Elektrik Üretim Ltd. Şti.	Prod.Comp.	Natural Gas	84.8	434.00	
Nuh Çimento San. Tic. A.Ġ.(Nuh Çim.) (İlave)	Prod.Comp.	Natural Gas	47	329.00	
Petkim Aliağa (Aliağa)	Autoproducer	Natural Gas	222	1188.00	
Petkim Aliağa (Aliağa)(Düzeltme-İlave)	Autoproducer	Natural Gas	52	278.27	
Rasa Enerji (Van)	Prod.Comp.	Natural Gas	78.6	500.00	
Şahinler Enerji (Çorlu/Tekirdağ)	Prod.Comp.	Natural Gas	26	185.00	
Selkasan Kağit Paketleme Malz. İm.	Autoproducer	Natural Gas	9.9	73.00	
Sönmez Elektrik(Uşak) (İlave)	Prod.Comp.	Natural Gas	8.7	67.06	
Süperfilm (Gaziantep)	AutoProducer	Natural Gas	25.3	203.00	
Tav İstanbul Terminal İşletme. A.Ş.	Autoproducer	Natural Gas	3.3	27.61	
Tav İstanbul Terminal İşletme. A.Ş.	Autoproducer	Natural Gas	6.5	54.39	
Tesko Kipa Kitle Paz. Tic. Ve Gida A.Ġ.	Autoproducer	Natural Gas	2.3	18.00	
Yurtbay Elektrik Üretim A.Ş. (D.G.+M)	Prod.Comp.	Natural Gas	6.9	50.00	
Zorlu Enerji (B.Karıştıran) (İlave)	Prod.Comp.	Natural Gas	49.5	396.00	
Cargill Tarim Ve Gida San. Tic. A.Ş.	AutoProducer	R-Biogas	0.1	0.70	
Gürmat Elekt. (Gürmat Jeotermal)	Prod.Comp.	R-Geothermal	47.4	313.00	
Akçay Hes Elektrik Ür. (Akçay Hes)	Prod.Comp.	R-HPP	28.8	45.00	
Akua Enerji (Kayalik Reg. Ve Hes)	Prod.Comp.	R-HPP	5.8	20.00	
Bağişli Reg. Ve Hes (Ceykar Elekt.)	Prod.Comp.	R-HPP	0	0.00	VCS 657
Bağişli Reg. Ve Hes (Ceykar Elekt.)	Prod.Comp.	R-HPP	0	0.00	VCS 658

Plant Name	Electricity Utilities	Fuel Type	Installed Capacity (Mw)	Firm Generation Capacity (GWh)	VER Status
Bereket Enerji (Koyulhisar Hes)	Prod.Comp.	R-HPP	0	0.00	VCS 713
Beyobasi En. Ür. A.Ş. (Sirma Hes)	Prod.Comp.	R-HPP	0	0.00	VCS 603
Cindere Hes (Denizli)	Prod.Comp.	R-HPP	19.1	30.00	
Değirmenüstü En. (Kahramanmaraş)	Prod.Comp.	R-HPP	12.9	17.38	
Denizli Elektrik (Ege I Hes)	Prod.Comp.	R-HPP	0.9	2.00	
Elestaş Elektrik (Yaylabel Hes)	Prod.Comp.	R-HPP	0	0.00	VCS 582
Elestaş Elektrik (Yazi Hes)	Prod.Comp.	R-HPP	0	0.00	VCS 583
Erva Enerji (Kabaca Reg. Ve Hes)	Prod.Comp.	R-HPP	4.2	7.50	
Erva Enerji (Kabaca Reg. Ve Hes)	Prod.Comp.	R-HPP	4.2	7.50	
Filyos Enerji (Yalnizca Reg. Ve Hes)	Prod.Comp.	R-HPP	0	0.00	GS 618
Kalen Enerji (Kalen I - Ii Hes)	Prod.Comp.	R-HPP	15.7	23.58	
Karel Enerji (Pamukova)	Prod.Comp.	R-HPP	0	0.00	GS 1073
Kayen Alfa Enerji (Kaletepe Hes)	Prod.Comp.	R-HPP	10.2	17.00	
Kisik	EÜAŞ	R-HPP	9.6	20.00	
Lamas Iii - Iv Hes (Tgt Enerji Üretim)	Prod.Comp.	R-HPP	35.7	71.00	
Obruk Hes	EÜAŞ	R-HPP	212.4	337.00	
Özgür Elektrik (Azmak Ii Reg.Ve Hes)	Prod.Comp.	R-HPP	0	0.00	VCS554
ÖZTAY ENERJİ (Günayğe REG.VE HES)	Prod.Comp.	R-HPP	0	0.00	GS636
Özyakut Elek. Ür.A.Ş. (Güneşli Hes)	Prod.Comp.	R-HPP	1.8	4.00	
Reşadiye 3 Hes (Turkon Mng Elekt.)	Prod.Comp.	R-HPP	0	0.00	GS645
Saritepe Hes (Genel Dinamik Sis.El.)	Prod.Comp.	R-HPP	0	0.00	?
Saritepe Hes (Genel Dinamik Sis.El.)	Prod.Comp.	R-HPP	0	0.00	?
Şirikçioğlu El.(Kozak Bendi Ve Hes)	Prod.Comp.	R-HPP	4.4	7.00	
Taşova Yenidereköy Hes (Hameka A.Ş.)	Prod.Comp.	R-HPP	2	6.00	
Tektuğ (Erkenek)	Prod.Comp.	R-HPP	0	0.00	VCS 693
Tektuğ (Erkenek) (İlave)	Prod.Comp.	R-HPP	0	0.00	VCS 694
Tocak I Hes (Yurt Enerji Üretim Sn.)	Prod.Comp.	R-HPP	4.8	6.00	
Tüm Enerji (Pinar Reg. Ve Hes)	Prod.Comp.	R-HPP	30.1	65.00	
Uzunçayir Hes (Tunceli)	Prod.Comp.	R-HPP	0	0.00	VCS 762
Yapisan (Karica Reg. Ve Darica I Hes)	Prod.Comp.	R-HPP	0	0.00	VCS 506
Yapisan (Karica Reg. Ve Darica I Hes)	Prod.Comp.	R-HPP	0	0.00	VCS 506
Yeşilbaş Enerji (Yeşilbaş Hes)	Prod.Comp.	R-HPP	0	0.00	VCS 806
Ypm Gölova Hes (Suşehri/Sivas)	Prod.Comp.	R-HPP	1.1	2.00	
Ypm Sevindik Hes (Suşehri/Sivas)	Prod.Comp.	R-HPP	5.7	18.00	
Itc-Ka Enerji (Sincan)	Prod.Comp.	R-Waste	0	0.00	GS 765
Itc-Ka Enerji Mamak Kati Atik Top.Merk.	Prod.Comp.	R-Waste	0	0	GS 440

Plant Name	Electricity Utilities	Fuel Type	Installed Capacity (Mw)	Firm Generation Capacity (GWh)	VER Status
Ortadoğu Enerji (Kömürcüoda)	Prod.Comp.	R-Waste	0	0.00	GS 707
Ortadoğu Enerji (Oda Yeri) (İlave)	Prod.Comp.	R-Waste	0	0	GS 707
Ortadoğu Enerji (Oda Yeri) (İlave)	Prod.Comp.	R-Waste	0	0	GS 707
Ak Enerji (Ayyildiz Res)	Prod.Comp.	R-WPP	0	0	GS 634
Alize Enerji (Çamseki Res)	Prod.Comp.	R-WPP	0	0.00	GS 399
Alize Enerji (Keltepe Res)	Prod.Comp.	R-WPP	0	0.00	GS 437
Alize Enerji (Sarikaya Res) (Şarköy)	Prod.Comp.	R-WPP	0	0.00	GS 577
Ayen Enerji A.Ş. Akbük Rüzgar	Prod.Comp.	R-WPP	0	0.00	GS 436
AYEN ENERJİ A.Ş. AKBÜK RÜZGAR (Ilave)	Prod.Comp.	R-WPP	0	0.00	GS 437
Baki Elektrik Şamli Rüzgar	Prod.Comp.	R-WPP	0	0.00	GS? http://www.aksaenerji.com.tr/tr/samliWEPP.aspx
Baki Elektrik Şamli Rüzgar	Prod.Comp.	R-WPP	0	0.00	GS? http://www.aksaenerji.com.tr/tr/samliWEPP.aspx
Belen Elektrik Belen Rüzgar-Hatay	Prod.Comp.	R-WPP	0	0.00	GS 390
Belen Elektrik Belen Rüzgar-Hatay	Prod.Comp.	R-WPP	0	0.00	GS 390
Borasko Enerji (Bandirma Res)	Prod.Comp.	R-WPP	0	0.00	GS 744?
Borasko Enerji (Bandirma Res)	Prod.Comp.	R-WPP	0	0.00	GS 744?
Datça Res (Datça)	Prod.Comp.	R-WPP	0	0.00	GS 428
Datça Res (Datça)	Prod.Comp.	R-WPP	0	0.00	GS 428
Datça Res (Datça) (Ilave)	Prod.Comp.	R-WPP	0	0.00	GS 428
Kores Kocadağ Res (Urla/İzmir)	Prod.Comp.	R-WPP	0	0.00	GS 601
Mazi-3 Res Elekt.Ür. A.Ġ. (Mazi-3 Res)	Prod.Comp.	R-WPP	0	0.00	GS 388
Mazi-3 Res Elekt.Ür. A.Ġ. (Mazi-3 Res)	Prod.Comp.	R-WPP	0	0.00	GS 388
Rotor Elektrik (Osmaniye Res)	Prod.Comp.	R-WPP	0	0.00	GS 474
Rotor Elektrik (Osmaniye Res)	Prod.Comp.	R-WPP	0	0.00	GS 474
Rotor Elektrik (Osmaniye Res)	Prod.Comp.	R-WPP	0	0.00	GS 474
Sayalar Rüzgar (Doğal Enerji)	Prod.Comp.	R-WPP	0	0.00	GS 1090
Soma Enerji Üretim (Soma Res)	Prod.Comp.	R-WPP	0	0.00	GS 398
Soma Enerji Üretim (Soma Res)	Prod.Comp.	R-WPP	0	0.00	GS 398
Soma Enerji Üretim (Soma Res)	Prod.Comp.	R-WPP	0	0.00	GS 398
Ütopya Elektrik (Düzova Res)	Prod.Comp.	R-WPP	0	0.00	GS 672
Total 2009			**2,765.90**	**21,489.72**	

Table- 8b
Source: http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning	VCS Status
SELİMOĞLU REG. VE HES	0.00	0.00	0.00	Private	Hydro	7-Jan-10	GS 635
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	Jeother-mal	13-Jan-10	GS 353
ROTOR ELEKTRİK (OSMANİYE RES)	0.00	0.00	0.00	Private	Wind	14-Jan-10	GS 474
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	Autopro-ducer	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	VCS 762
ALTINMARKA	4.60	37.02	37.02	Autoprod ucer	Natural Gas	28-Jan-10	
CAN TEKSTİL (Çorlu/TEKİRDAĞ)	7.83	60.25	60.25	Autoprod ucer	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 BiogasI)	0.00	0.00	0.00	Private	Biogas	1-Feb-10	GS 745
AKBAŞLAR (İlave)	1.54	1.54	12.08	Autoprod ucer	Natural Gas	18-Feb-10	
ASA ENERJİ (KALE REG.ve HES)	9,6	0.00	0.00	Private	Hydro	19-Feb-10	GS 637
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	GS 707
KONYA ŞEKER SAN. VE TİC. A.Ş.1	6.00	36.00	36.00	Autoprod ucer	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	GS 683
FLOKSER Tekstil (Çatalça-İstanbul)(Süetser tesisi)	-2.13	0.00	0.00	Autoprod ucer	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	GS 474
SOMA ENERJİ ÜRETİM (SOMA RES)	4.50	0.00	0.00	Private	Wind	10-Mar-10	GS 655
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	VCS 553
AKDENİZ ELEKTRİK (MERSİN RES)	33,0	0.00	0.00	Private	Wind	19-Mar-10	GS 753
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	

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning	VCS Status
MENDERES GEOTERMAL DORA-2	0.00	0.00	0.00	Private	Jeotherm al	26-Mar-10	GS 445
ASMAKİNSAN (BANDIRMA 3 RES)	4.00	0.00	0.00	Private	Wind	26-Mar-10	GS 683
ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	5.91	0.00	0.00	Private	Hydro	1-Apr-10	VCS 544
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	GS 872
NİSAN E.MEKANİK EN. (BAŞAK REG. HES)	6.85	22.00	12.00	Private	Hydro	9-Apr-10	
BOREAS ENERJİ (BOREAS I ENEZ RES)	15,0	0.00	0.00	Private	Wind	9-Apr-10	GS 702
UZUNÇAYIR HES (Tunceli) (İlave)	27.33	0.00	0.00	Private	Hydro	11-Apr-10	VCS 762
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	Autoprod ucer	Biogas	21-Apr-10	
YILDIZ ENTEGRE AĞAÇ (Kocaeli)	12.37	79.79	79.79	Autoprod ucer	Natural Gas	22-Apr-10	
BAKRAS EN. ELKT.ÜR. A.Ş. ŞENBÜK RES	15,0	0.00	0.00	Private	Wind	22-Apr-10	GS 733
ALİZE ENERJİ (KELTEPE RES)	1.80	0.00	0.00	Private	Wind	28-Apr-10	GS 437
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	GS765
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	Autoprod ucer	Natural Gas	27-May-10	
AKIM ENERJİ (CEVİZLİK REG. VE HES)	91,4	0.00	0.00	Private	Hydro	28-May-10	VCS 753
CEYHAN HES (OŞKAN HES) (ENOVA EN.)	23.89	0.00	0.00	Private	Hydro	3-Jun-10	VCS 810
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	GS 474
ÇAKIT HES (ÇAKIT ENERJİ A.Ş.)	20.18	0.00	0.00	Private	Hydro	10-Jun-10	VCS 685
SOMA ENERJİ ÜRETİM (SOMA RES)	7.20	0.00	0.00	Private	Wind	10-Jun-10	GS 655
PAŞA REG. VE HES (ÖZGÜR ELEKTRİK)	8.68	0.00	0.00	Private	Hydro	11-Jun-10	GS 681
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	VCS 893

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning	VCS Status
BERGAMA RES EN. ÜR. A.Ş. ALİAĞA RES	37.50	0.00	0.00	Private	Wind	16-Jun-10	GS 735
MAZI-3 RES ELEKTRİK (MAZI-3 RES)	7.50	0.00	0.00	Private	Wind	18-Jun-10	GS 388
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	VCS 535
BORASKO ENERJİ (BANDIRMA RES)	12.00	0.00	0.00	Private	Wind	30-Jun-10	GS 744
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	VCS
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	VCS 544
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	
YAVUZ REG. VE HES (MASAT ENERJİ)	22.50	0.00	0.00	Private	Hydro	14-Jul-10	GS 651
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	GS 617
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	GS 726
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	GS 655
ERİKLİ-AKOCAK REG. ve AKOCAK HES	41.25	0.00	0.00	Private	Hydro	29-Jul-10	VCS 535
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	GS 707
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	GS 398
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	

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning	VCS Status
CEYHAN HES (BERKMAN HES)(ENOVA EN.)	12.61	0.00	0.00	Private	Hydro	20-Aug-10	VCS 810
SOMA ENERJİ ÜRETİM (SOMA RES)	6.30	0.00	0.00	Private	Wind	20-Aug-10	GS 655
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	VCS 810
KARŞIYAKA HES (AKUA ENERJİ ÜRET.)	1.59	0.00	5.00	Private	Hydro	28-Aug-10	GS 637
ITC ADANA BİOKÜTLE SANT.	0.00	0.00	0.00	Private	LFG	2-Sep-10	GS 715
BELEN ELEKTRİK (BELEN RES) (İlave)	6.00	0.00	0.00	Private	Wind	2-Sep-10	GS 390
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	GS 672
BERGAMA RES EN. ÜR. A.Ş. ALİAĞA RES	52.50	0.00	0.00	Private	Wind	4-Sep-10	GS 735
ROTOR ELEKTRİK (OSMANİYE RES)	17.50	0.00	0.00	Private	Wind	4-Sep-10	GS 474
SELEN ELEKTRİK (KEPEZKAYA HES)	28.00	0.00	0.00	Private	Hydro	6-Sep-10	VCS
REŞADİYE 2 HES (TURKON MNG ELEKT.)	26.14	0.00	0.00	Private	Hydro	17-Sep-10	GS 644
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	GS 400
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	GS 655
ERENKÖY REG. VE HES (TÜRKERLER)	21.46	87.00	49.00	Private	Hydro	7-Oct-10	
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	GS 617
KAHTA I HES (ERDEMYILDIZ ELEK. ÜRT.)	7.12	0.00	0.00	Private	Hydro	14-Oct-10	GS 675
ROTOR ELEKTRİK (GÖKÇEDAĞ RES) (İlave)	2.50	0.00	0.00	Private	Wind	15-Oct-10	GS 474
AZMAK-II REG. VE HES (Düzeltme)	-18.07	0.00	0.00	Private	Hydro	25-Oct-10	GS 745
ITC ADANA BİOKÜTLE SANT. (Düzeltme)	0.00	0.00	0.00	Private	LFG	25-Oct-10	GS 715
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	VCS 536

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning	VCS Status
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	VCS 419
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	GS 576
SOMA RES (BİLGİN Wind SAN.)(İlave)	30.00	0.00	0.00	Private	Wind	11-Nov-10	GS 399
ULUABAT KUVVET TÜNELİ VE HES (İlave)	48.51	0.00	0.00	Private	Hydro	25-Nov-10	VCS 536
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	GS 755
REŞADİYE 1 HES (TURKON MNG ELEKT.)	15.68	0.00	0.00	Private	Hydro	26-Nov-10	GS 643
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	GS 576
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	GS 1068
SARES RES (GARET ENERJİ ÜRETİM)	15.00	0.00	0.00	Private	Wind	22-Dec-10	GS 963
FEKE 2 BARAJI VE HES (AKKUR ENERJİ)	69.34	0.00	0.00	Private	Hydro	24-Dec-10	VCS 534
EGEMEN 1B HES (ENERSİS ELEKTRİK)	11.10	0.00	0.00	Private	Hydro	28-Dec-10	GS 755
EREN ENERJİ ELEKTRİK ÜR. A.Ş. (İlave)	600.00	4,005.88	4,005.88	Private	Coal	29-Dec-10	
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	VCS 905

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning	VCS Status
TURGUTTEPE RES (SABAŞ ELEKTRİK ÜR.)	22.00	0.00	0.00	Private	Wind	30-Dec-10	GS 610
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	
		27,041.71	26,256.04				

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

T.C.
Çevre ve Orman Bakanlığı

T.C.
DENİZLİ VALİLİĞİ
İL ÇEVRE ve ORMAN MÜDÜRLÜĞÜ

Karar Tarihi : 01./07/2011
Karar No : 40

ÇEVRESEL ETKİ DEĞERLENDİRME BELGESİ

17 Temmuz 2008 tarih ve 26939 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliğinin Ek-II listesinde yer alan "**Akbaş Regülatörü ve 12,26 MWe / 12,77 MWm Kurulu güce sahip Hidroelektrik Santrali (Akbaş Regülatörü ve Hidroelektrik Santrali Revize Projesi)** " projesi ile ilgili olarak inceleme-değerlendirme yapılmış ve Proje Tanıtım Dosyasında çevresel etkilere karşı alınması öngörülen önlemler yeterli görülmüştür. Ayrıca ÇED Raporu hazırlanmasına gerek bulunmadığı tespit edilmiş olup, söz konusu projeye ÇED Yönetmeliğinin 17.Maddesi gereğince Valiliğimizce "Çevresel Etki Değerlendirmesi Gerekli Değildir Kararı" verilmiştir.

Ekrem ERDOĞAN
Vali a.
Vali Yardımcısı

Proje Sahibi : Arı Su Enerji Üretim Ltd.Şti.
Projenin Yeri : Denizli İli, Bekilli İlçesi, Çoğaşlı Köyü ve Çal İlçesi, Çalçakırlar Köyü, Büyük Menderes Nehri üzerindedir.

Annex-4: Weir Lake Coverage Area Map