Voluntary Carbon Standard
Project Description

The Yokuslu- Kalkandere Hydroelectric Power Plant

August 2011

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1 Description of Project:

1.1 Project title

***The Yokuslu-Kalkandere Hydroelectric Power** Plant (The project will be refered as **Kalkandere HEPP** in the rest of this document)*
Version 8, 05/08/2011

1.2 Type/Category of the project

This is a voluntary project, but it follows the CDM rules.

The approved baseline and monitoring methodology ACM0002-Version 12: *"Consolidated baseline methodology for grid-connected electricity generation from renewable sources"* ("*ACM0002*") is applied.

According to Annex A of the Kyoto Protocol, the Project fits in:
Sectoral Scope Number: 1
Sectoral Scope: Energy Industries -Renewable Energy

The project is not a grouped project.

1.3 Estimated amount of emission reductions over the crediting period including project size:

Project size	Tonnes CO_2 equivalent emissions reductions per year.	*Kalkandere Run-of-River Hydroelectric Power Plant*
Micro project	Less than 5.000	NO
Project	Between 5.000 and 1.000.000	YES
Mega Project	More than 1.000.000	NO

Once implemented, it is estimated that the Project will reduce 100,089 tCO_2e annually, when both power houses are in operation, generating an expected total of 977,701 tCO_2e for the duration of the initial 10-year crediting period. The Project's estimated annual ERs over the 10-year crediting period are as follows:[1]

Year	Annual estimation of emissions reductions in tonnes of CO_2e
2011	79.545
2012	97.444
2013	100,089
2014	100,089
2015	100,089
2016	100,089
2017	100,089
2018	100,089
2019	100,089

[1] The first unit of the first power house started to generate electricity on December 30, 2010. The other two units were commissioned on January 28, 2011. Therefore, emission reductions of the project are calculated for only first unit in January 2011. In addition, the second power house (Kizilagac) is expected to be commenced on March 1st, 2012.

2020	100,089
Total estimated reductions (tonnes of CO_2)	**977,701**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	97,770

1.4 A brief description of the project:

The Kalkandere Hydroelectric Project consists of the construction of a greenfield one weir and two run-of-river hydroelectric power plants located in the İyidere river basin, in Turkey's Eastern Blacksea Region. Total installed capacity of the project will be 43,47MWm / 42,33MWe

The plant has been designed to generate electricity by utilizing the 100.2 m of head between the tailwater level of the upstream existing Cevizlik HEPP and the Incirlik HEPP project which is under project stage and will be located downstream.

The water diverted from the weir will be transferred to "Kalkandere Power House" through a tunnel. The total installed capacity of the turbines in Kalkandere Power House is 35,79 MWm. The turbined water will be transferred to "Kizilagac Power House" through another tunnel. The total installed capacity of this plant is 7,68 MWm

The main purpose of the project is to generate approximately 179,050 MWh/year of electricity to supply the national grid using a renewable resource and tapping the significant hydropower potential in the region. The project activity reduces greenhouse gases (GHGs) emissions that would have otherwise occurred in the absence of the project activity by avoiding electricity generation from fossil fuel sources. The average annual emission reductions of the proposed Project for the initial crediting period are estimated to be 100,089 tonnes of CO_2e (tCO_2e).

The Kalkandere Hydroelectric Project contributes to the region's sustainable development in particular and Turkey's sustainable development in general by:

- increasing the use of renewable energy sources for generating electricity
- meeting the need of electricity generation and supply in Turkey in a sustainable way,
- decreasing the consumption of fossil fuels,
- reducing emission of GHGs from the national electricity grid, thereby reducing the effects of global climate change in the medium and long term, and
- providing job opportunities as expectedly 200 people on average will be hired during the four years construction phase of the project.

The project contributed in the social and economic development in the project area significantly as:

- the project owner has donated almost around 1 million Dolars (1,669,273 TL) to social and economic development projects at the region of the project activity. Donations were made to Rize and Trabzon, the two nearest cities to the project area, Government Offices for renovations of some public buildings. Some schools in the project area were provided with stationery supply as well as food and milk to improve the nutritional conditions for the students. Local people in the project area use mechanical cable cars for transportation.
- the project owner made its machinery and equipment available for construction and improvement of public buildings and infrastructure in the project area.

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

The Project site is located in Turkey, in Eastern Black Sea, in the boundaries of Rize province; two powerhouses of the project are located as following:

Kalkandere Powerhouse between 40º 53 '47"-north latitudes and 40º 25' 45" east longitudes.
Kizilagac Powerhouse between 40 º 54' 27,81" -north latitudes and 40 º 25' 16,97" east longitudes.

The following figure shows the project's location:

***Figure 1**: Project's location*

1.6 Duration of the project activity/crediting period:

- Project start date: 30th of December 2010 (Date on which the project commenced electricity production)
- VCS crediting period start date: January 1st, 2011[2]
- VCS project crediting period: 10 years, renewable once. (Total crediting period 20 years)

1.7 Conditions prior to project initiation:

As the project activity is a Greenfield project, the conditions prior to the project initiation is the continuation of the current situation, i.e. the equivalent amount of energy would have been produced by other grid-connected units, which are mainly thermal power plants, undertaking business as usual maintenance.

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

The Kalkandere Hydroelectric Power Plant reduces greenhouse gas emissions that would have otherwise occurred in the absence of the project activity by avoiding electricity generation from

[2] The commissioning date of the project is December 30, 2010. However, the crediting period is started with the first day of 2011.

fossil fuel sources both in the operating margin and build margin of the system. The average annual emission reductions of the proposed Project for the initial crediting period are estimated to be 97,770 tonnes of CO_2e (tCO_2e).

1.9 Project technologies, products, services and the expected level of activity:

Project Technology:

The following table shows a full detail of the project's technical specifications:

Kalkandere Power Plant

Property	Unit	Amount
Catchment Area	km^2	881.70
Average Discharge	m^3/s	29.52
Design Discharge	m^3/s	50.00
Regulator Crest Elevation	m	220.00
Regulator Thalweg Elevation	m	214.00
Flood Water Level	m	224.92
Flushing Gate		
Crest Elevation	m	214.00
Foundation Elevation	m	213.50
Crest Length	m	4.00
Number of Gates		2
Gate Size	m x m x m	3.00 x 3.00 x 4.00
Settling Basin		
Width	m	3.00 X 4.00
Settled Particular Size	mm	0.30
Settling Tunnel		
Type		underground tunnel
Number of Tunnels		3
Inner Diameter	m	4.00
Thickness of Concrete	m	0.50
Tunnel Capacity	m3/s	16.67
Tunnel Length	m	50.00
Headrace Tunnel		
Type		Circular, concrete lined pressure tunnel
Inner Diameter	m	4.00
Thickness of Concrete	m	0.40
Tunnel Capacity	m^3/s	50.00
Headrace Tunnel Length	m	6,806.00
Surge Tank		
Type		Varying Cross Section
Top Elevation	m	238.50
Bottom Elevation	m	139.60
Max. Water Level	m	234.67
Minimum Water Level	m	190.25
Inner Diameter	m	4.00 - 16.00
Penstock		
Inner Diameter	m	3.60
Average Steel Thickness	mm	15.50
Length	m	199.85
Powerhouse		
Length	m	46.00
Width	m	17.40

Project Discharge	m^3/s	50.00
Tailrace Elevation	m	119.00
Turbine Axis Level	m	117,50
Turbine Type		Horizantal Axis Francis
Gross Head	m	100.20
Net Head	m	76.09
Installed Capacity	MW_e	35.79
Unit Capacity	MW_e	11.93
Number of Units		3

Table 1: *Kalkandere's Technical properties*

Kizilagac Power Plant:

Property	Unit	Amount
Average Discharge	m^3/s	29.52
Design Discharge	m^3/s	50.00
Headrace Tunnel		
Type		Lined Pressure Tunnel
Inner Diameter	m	4.00
Thickness of Concrete	m	0.40
Tunnel Capacity	m3/s	50,00
Headrace Tunnel Length	m	1,150.00
Surge Tank		
Type		Varying Cross Section
Top Elevation	m	126.00
Bottom Elevation	m	111.00
Max. Water Level	m	124.00
Minimum Water Level	m	111.90
Inner Diameter	m	4.00m (down), 22.00m (up)
Penstock		
Inner Diameter	m	3.80
Average Steel Thickness	mm	50.00
Length	m	55.00 (to manifold)
Powerhouse		
Length	m	34.00
Width	m	27.50
Project Discharge	m^3/s	50.00
Tailrace Elevation	m	102.60
Turbine Axis Level	m	98.00
Turbine Type		Vertical Axis Kaplan
Gross Head	m	1,600
Net Head	m	12.00
Installed Capacity	MWm	7.68
Unit Capacity	MWm	2.56
Number of Units		3

Table 2: *Kizilagac's Technical properties*

The turbine and generator manufacturer is Voith Hydro and Indar -. The manufacturer is an German and Spain companies, acclaimed for its integrated power plants and power production services. For Kalkandere Power Plant, Voith Hydro and Siemens has been selected as the equipment provider because of its reliable quality products and technology, which is a grid friendly technology with low maintenance needs as well as low noise and low environmental impacts. For Kizilagac Power Plant negotiation are being carried on for the supplier selection.

The design will be set according to the Computational Fluid Dynamics based calculations. The equipments and mechanical parts will be manufactured abroad and then delivered to the project

site. This technology has been chosen because it has been considered to be the most suitable for the project.

Expected level of activity:

As it was stated in ***Section 1.4***, Kalkandere Hydroelectric Project will generate approximately 179,050 MWh of electricity annually. The following figure and table show the monthly expected level of activity:

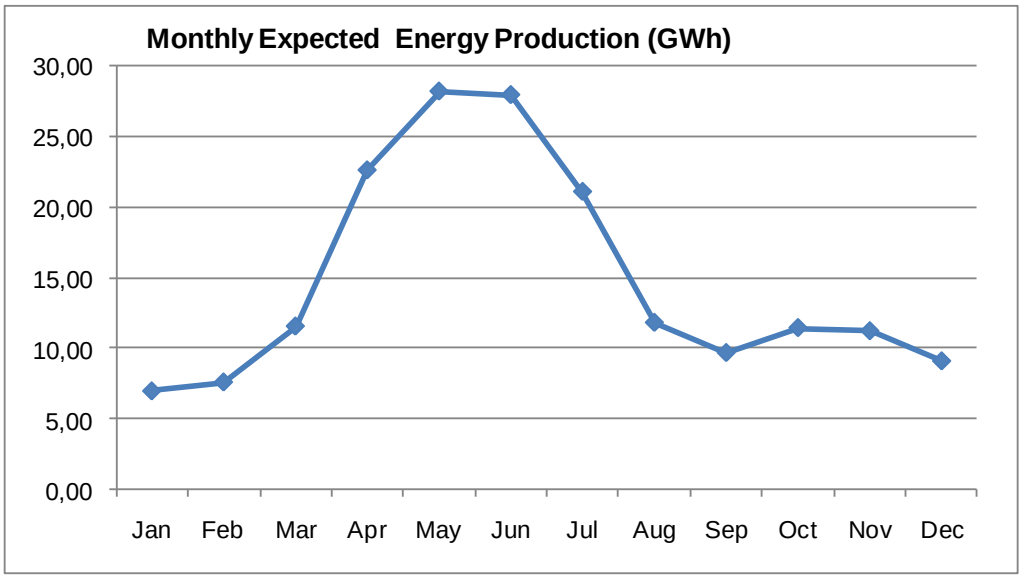


Figure 2: *Kalkandere's Expected level of Activity*

Months	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*TOTAL*
Monthly Energy (GWh)	6.97	7.60	11.55	22.58	28.15	27.90	21.06	11.81	9.68	11.44	11.22	9.09	**179.05**

Table 3: *Expected Level of Activity of Kalkandere HEPP*

The following figures show the plant lay-out and the operation diagram:

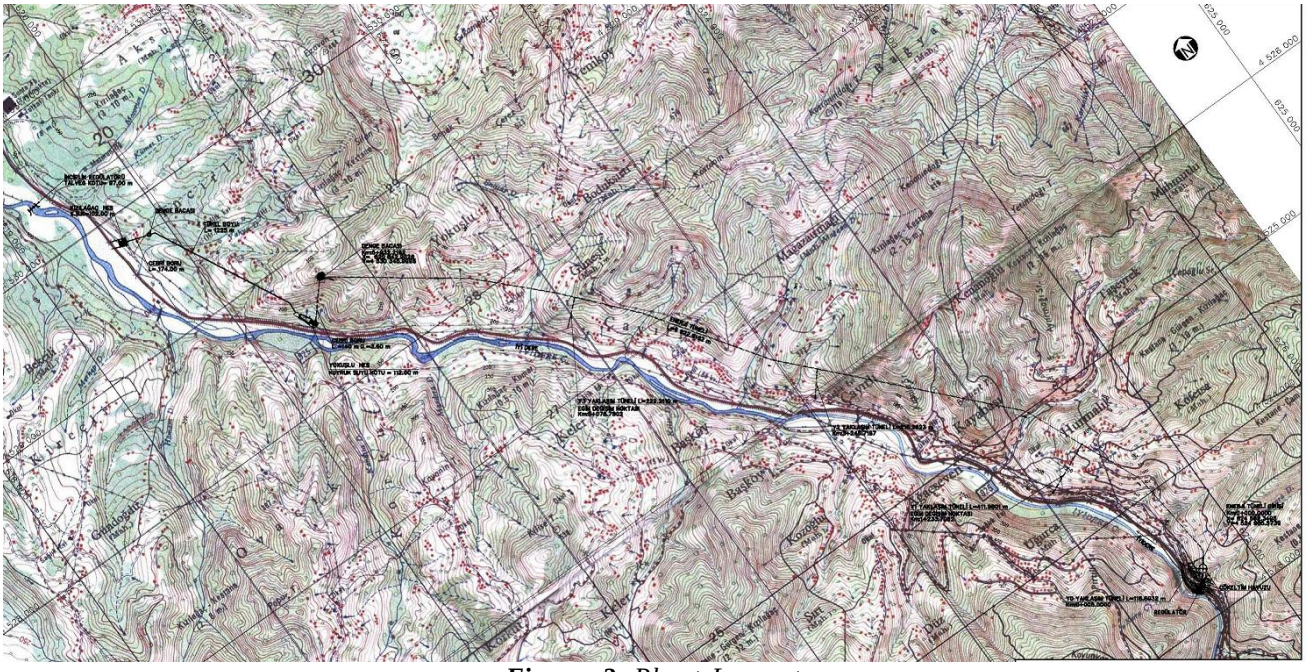


Figure 3: *Plant Layout*

1.10 Compliance with relevant local laws and regulations related to the project:

The applicable mandatory laws that will be applied for the project are:

i. *Electricity Market Law*[3]: It was enacted in March 3rd, 2001. This Law aims to ensure the development of a financially sound and transparent electricity market operating in a competitive environment under the provisions of the civil law. It also underlines the needs to produce a sufficient, high quality, low cost and environmentally friendly electricity to consumers. The text also provides guidelines to structure the autonomous regulation and the supervision of the market.

ii. *The Renewable Energy Law*[4]: It compels electricity selling companies to purchase from "Green" energy providers until 2011 at a defined ratio and price. This ratio is based on previous year sales over total energy sold in the country. The price is based on a yearly average wholesale purchase price predetermined by the Energy Market Regulatory Authority (EMRA).

iii. *Environmental Law*[5]: This law came into force in 1983, it considers the environment as a single domain, aiming not only to prevent and eliminate environmental pollution, but also to allow the management of land and natural resources in an integrated manner. According to its basic principles, and as also stated in the Constitution, citizens as well as the State bear responsibility for the environment protection. Furthermore, this law states that in all economic activities, every measure should be taken to minimize pollution.[6]

iv. Regulation on procedures and principles of signing the agreement of water resources utilization to generate electricity for the electricity market[7].

The project complies with all aforementioned laws as its activity aims at generating electricity by using a renewable resource: hydroelectric power; in a sufficient, low-cost and environmentally-friendly manner, using the latest technology available on the market. Due to its law impact to the environment the project was not required to conduct an EIA study by Ministry of Environment of Turkey. However, the project owner opted to conduct an EIA study in order to be on the safe side as far as the environmental impact is concerned. Therefore an Environmental Impact Assessment (EIA) has been carried out and the results of this study concluded that the project activity has no significant impacts on the environment. (Please refer to ***Section 5*** for detailed information).

Furthermore, in the official letter from Ministry of Culture and Tourism, Trabzon Regional Council of Protection of Cultural and Natural Assets, dated May 26th 2005[8], it was declared that there are not any cultural or historical assets in the Project site as defined within the scope of the Laws No: 3386, 5226 and 2863.

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

According to Water Utility Rights which was signed for Kalkandere HEPP with Turkish State Hydraulic Works (DSI), DSI may instruct to increase the amount of water to be released from the water intake structure to the river bed for the future basin's needs for potable water. This means that the expected electricity generation may be subject to decrease upon DSI's request. Thus, substantially affecting the project's GHG emission reductions.

[3] Law Number: 4628 Ratification Date: 20.02.2001 Enactment Date: 03.03.2001

[4] Law Number: 5346 Ratification Date: 10.05.2005 Enactment Date: 18.05.2005

[5] Law Number2872 Ratification Date: 09.08.1983 Enactment Date: 11.08.1983

[6] *"Turkey's Environment: a review and evaluation of Turkey's environment and its stakeholders"*, May 2002. *http://archive.rec.org/REC/Programs/ExtensionToTurkey/TurkeysEnvironment.pdf*

[7] Official Gazette: #25150, on 26.6.2003

[8] Letter number 254.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

At the project's site, it is only foreseen to generate electricity by the installation of a Greenfield renewable power plant. Hence, no previous GHG emissions have occurred.

The project proponent has initiated this project with the aim to supply electricity to the grid, and not primarily for creating GHG emissions in the prospect of their subsequent removal.

Moreover, since the project activity is the installation of a new hydroelectric power plant, the average annual emission reductions of the proposed Project for the initial crediting period are estimated to be 97,770 tonnes of CO_2e (tCO_2e).

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

The project has not created another form of Environmental Credit. (Please refer to ANNEX 2).

1.14 Project rejected under other GHG programs (if applicable):

The project has not been rejected under any other GHG programs.

1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:

The project developer:
In accordance with the Electric Market Law No. 4628, Akim Enerji Üretimi Sanayi ve Ticaret A.Ş. (hereafter, Akim Enerji) was founded to construct, commission, operate and transfer a hydroelectric power plant in order to generate and market electric power.

Its mission is to be one of the energy companies that effectively utilize domestic and renewable resources by transforming advanced technology and knowledge into efficiency and making a maximum contribution to national economy without neglecting international quality standards.

Akim Enerji has the vision and ambition to be a reputable and a leading company that takes a pioneering role in the world of today's standards by utilizing energy resources within the country in the most efficient and environmentally friendly way.

The Kalkandere Hydroelectric Power Plant project shall be registered as a Voluntary Carbon Standard (VCS-VER) project to enable the project implementation by means of financial inflows coming from the carbon credits sale. All elements mentioned in this document show that the proposed project activity is expected to fulfil the requirements of the Voluntary Carbon Standard.

The following table shows the project proponent's contact information:

Organization:	AKIM ENERJI URETIMI SANAYI VE TICARET A.S.
Street/P.O.Box:	SANKO HOLDING-ISKO SUBESI ORG.SAN.BOL.3.CADDE
Building:	B BLOK 3.KAT ATTN: MR.VOLKAN DOGAN
City:	INEGOL / BURSA
State/Region:	
Postfix/ZIP:	16400
Country:	TURKEY
Telephone:	+90-224-280-77-94
FAX:	+90-224-714-93-10
E-Mail:	sankoenerji@sankoenerji.com.tr
URL:	http://www.sankoenerji.com.tr/eng/default.asp

Represented by (1):	
Position:	INVESTMENT MANAGER, HYDROELECTRIC POWER PLANTS
Last Name:	DOGAN
Middle Name:	
First Name:	VOLKAN
Department:	ENERGY INVESTMENTS
Mobile:	+90-533-369-49-78
Direct FAX:	+90-224-714-93-10
Direct tel:	+90-224-280-77-94
Personal E-Mail:	vdogan@sankoenerji.com.tr
Represented by (2):	
Position:	HEPP INVESTMENT ASSISTANT COORDINATOR
Last Name:	SENGONUL
Middle Name:	
First Name:	TANER
Department:	ENERGY INVESTMENTS
Mobile:	+90-542-333-93-75
Direct FAX:	+90-224-714-93-10
Direct tel:	+90-224-280-77-00
Personal E-Mail:	tsengonul@sankoenerji.com.tr

The as stated before the contacts persons are Mr. Volkan Dogan and Mr. Taner Sengonul. Their responsibilities regarding the carbon credits process are to analyze the related documents, the coordination between internal departments and to setup meetings with companies.

The following table shows the Carbon consultants' contact information:

Organization:	Gaia Carbon Finance
Street/P.O.Box:	Halaskargazi Cad. Zafer Sok..
Building:	Manuel Apt. No : 11/4
City:	Istanbul
State/Region:	
Postfix/ZIP:	
Country:	Turkey
Telephone:	+90 212 224 04 50
FAX:	+90 212 224 04 66
66E-Mail:	
URL:	http://www.gaiacf.com
Represented by (1):	
Position:	Managing Partner
Last Name:	BAYRAKTAR
Middle Name:	
First Name:	GURKAN
Department:	
Mobile:	+90 530 404 93 13
Direct FAX:	+90 212 224 04 66
Direct tel:	+90 212 224 04 50
Personal E-Mail:	gbayraktar@gaiacf.com

GaiaCF's responsibilities regarding the carbon credits process are the preparation of the PD and assisting Akim Enerji during the validation process,

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):

There is not any relevant information to supplement.

1.17 List of commercially sensitive information (if applicable):

As a Akim Enerji,company policy we do not find ethical to announce this social and financial aids, therefore this is commercially sensitive information that needs to be excluded from the public version of the VCS PD that will be displayed on the VCS Project Database.

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

Additionality, for the purpose of calculating the emission factor of the Turkish electricity grid," Tool to calculate emission factor for an electricity system", Version02 is employed. The baseline for the project was established through the official methodology of ACM0002 / Version 12, named "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"[8] as approved by the CDM Executive Board. Conservative options and data were selected during the implementation of the methodology.

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

The methodology is applicable to grid-connected renewable power generation activities under certain conditions. The applicability conditions of the approved consolidated methodology and how the project activity complies with them are described below:

Applicability condition in the ACM0002/Version 12	Compliance of the condition
This methodology is applicable when the project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The project activity is a Greenfield grid connected run-of–river hydropower project. The project activity is located across the İyidere river basin. The water is diverted using a diversion wall structure to the energy tunnel and then to the powerhouse. The water will be fed back to river through the tailrace canal. The diversion structure does not result in storage of water.
In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the	This condition is not applicable to the project activity as it involves the installation of a new hydroelectric power plant.

implementation of the project activity.	
In case of hydro power plants, one of the following conditions must apply: - The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or - The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; or - The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	This condition is not applicable to the project activity as it does not result in a new reservoir. However, the project activity involves the construction of aweir and behind this weir there will be a water pond with a surface area of 2,205 m^2. The power density (PD) for this regulation pond is calculated as follows: PD = 43,470,000 W/2,205m^2 PD = 19,714 W/m^2 PD > 4 W/m^2 PD > 10 W/m^2, therefore, according to the methodology, there will be no emissions from the pond.
This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the base line may be the continued use of fossil fuels at the site.	This condition is not applicable to the project activity as it does not involve switching from fossil fuel to renewable energy at the site of the project activity.
This methodology is not applicable to biomass fired power plants.	This condition is not applicable to the project activity as it does not involve the installation of a biomass fired power plant.
In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	This condition is not applicable to the project activity as it does not involve a capacity addition, retrofit or replacement of existing grid-connected renewable power plant/unit(s).

Hence, the approved consolidated methodology ACM0002 is applicable to the project activity.

The project activity also complies with the applicability conditions of the "*Tool to calculate the emission factor for an electricity system"* (Version 02) as it displaces electricity generated by power plants in the Turkish electricity system. Moreover, it complies with the applicability criteria of the *"Tool for the demonstration and assessment of additionality"* (Version 05.2), as according to paragraph 6, this tool provides a general framework for demonstrating and assessing additionality and is applicable to a wide range of project types.

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

Potential leakage emissions in the context of power sector projects are emissions that arise from the project activities such as power plant construction, fuel handling and land inundation. According to ACM0002 / Version 12, such emissions do not need to be taken into account.

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the national electricity grid.

The greenhouse gases and emission sources included in or excluded from the project boundary are listed in the table below:

Source		Gas	Included?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project activity	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	Minor emission source.
		CH_4	Yes	CH_4 emissions are neglected as the project activity's power density is above 10.
		N_2O	No	Minor emission source.

***Table 4*:** The justification for project boundary

Indirect emissions can result from project construction, transportation of materials and other upstream activities. In the case of the proposed project activity, these emissions are thought to be comparable or less than the life cycle emissions which would result from the eventual construction and operation of alternative capacity. The life cycle emissions of alternative power generation plants, in particular fossil fuel-fired power plants, are typically higher than those from hydroelectric power plants when including emissions due to mining, refining and transportation of fossil fuel. The project does not claim emissions reductions from these activities. Therefore no significant net leakage from the above activities was identified. This approach is conservative.

For the purpose of determining the electricity emission factor, the project electricity system is defined as the overall Turkish electricity network. There is an interconnected system for the electric distribution in Turkey[9]. Thus there is no independent regional electricity system or any significant transmission constraints. For electricity imports from neighbour countries, the emission factor of 0 ton of CO_2 per MWh is applied.

No GHG sources in terms of sinks and reservoirs could be identified for this project.

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

The Kalkandere Hydroelectric Power Plant Project entails the construction and operation of a 42.33 MWe installed electricity production capacity in two different power houses. In Kalkandere Power Plant there are 3 turbines with 11.68 MWe each. In Kizilagac Power Plant it is planned that there will be again 3 turbines with 2.43 MWe installed capacity each.

The project electricity system is defined as "the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints" in the "Tool to calculate the emission factor for an electricity system ". Similarly, "a connected electricity system, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint" in the same document."

[9] TEİAŞ and Energy Efficiency and Renewable Energy, Turkey - National study, Pr Ahmet Koyun, Termodinamik Anabilim Dal, Yildiz Teknik Universitesi, March 2007, Page 71

In this case "the project electricity system" and "the connected system" are same as also confirmed by TEIAS (Turkish Electricity Transmission Company Inc.),[21] the Turkish transmission system is interconnected. There is not an independent regional grid system neither in Rize nor in Black Sea Region.

In addition to this, since there is no DNA in the host country to delineate the project electricity system, the suggested criteria in "Tool to calculate the emission factor for an electricity system" was used. Since there is no capacity usage figure for transmission line published, the criteria "The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year." could not be proved.

On the other hand, there is no spot electricity market available in the country as suggested in the other criteria "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." Therefore, this criterion is not applicable as well.

As suggested in "Tool to calculate the emission factor for an electricity system", "if these criteria does not result in a clear grid boundary, use a regional grid definition in the case of large countries with layered dispatch systems (e.g. provincial / regional / national)." However, there are no layered dispatch systems in the country. As a result the national grid was used as the project electricity system. Hence, the estimation of OM (Operating Margin) and BM (Built Margin) are based on the definition of the Turkish electricity network as one single interconnected system.

The method to describe and calculate the baseline has clearly been specified by the Baseline Methodology. CDM Executive Board has already provided a consolidated tool for appraising and demonstrating the additionality feature of the projects.

Since the project is an installation of a new grid-connected renewable power plant, the baseline scenario is formulated in ACM0002 / Version 12: *"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, as reflected in the Combined Margin (CM) calculations described below".*

The project is not a modification/retrofit of an existing grid-connected renewable power plant/unit. Therefore the other alternative baseline scenario mentioned in ACM0002 / Version 12 is not chosen.

According to the "Baseline Methodology Procedure" in "Tool to calculate the emission factor for an electricity system" following steps should be followed.

All the information pertaining to the grid and estimating baseline emissions are publicly available, and was available at the website of TEIAS (Turkish Electricity Transmission Company Inc. - www.teias.gov.tr).

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

The project's additionality has been demonstrated using the latest version of the "*Tool for the demonstration and assessment of additionality"*- Version 05.2. This tool equals the Test 1- The Project test.

[21] *TEIAS is the legal entity responsible by law to collect and announce data related to electricity production and consumption in Turkey. All Turkey related electricity production, fuel consumption in electricity production, average full load working hour, electricity consumption etc figures(or data used in calculating the related data) used in this document were received from the internet site of TEIAS (which is www. TEIAS.gov.tr) unless otherwise stated.*

The following steps from the additionality tool are completed below:

***STEP 1* – Identification of alternatives to the project activity consistent with current laws and regulations**

Sub-step 1a- Define alternatives to the project activity:
The alternatives available to the proposed Project that provide outputs or services comparable with the proposed VCS project activity include:

Alternative 1: The proposed project activity undertaken without being registered as a VCS project activity.

As it was stated in ***Section 1.10***, Alternative 1 is in compliance with legal and regulatory requirements. Therefore, Alternative 1) is a credible alternative.

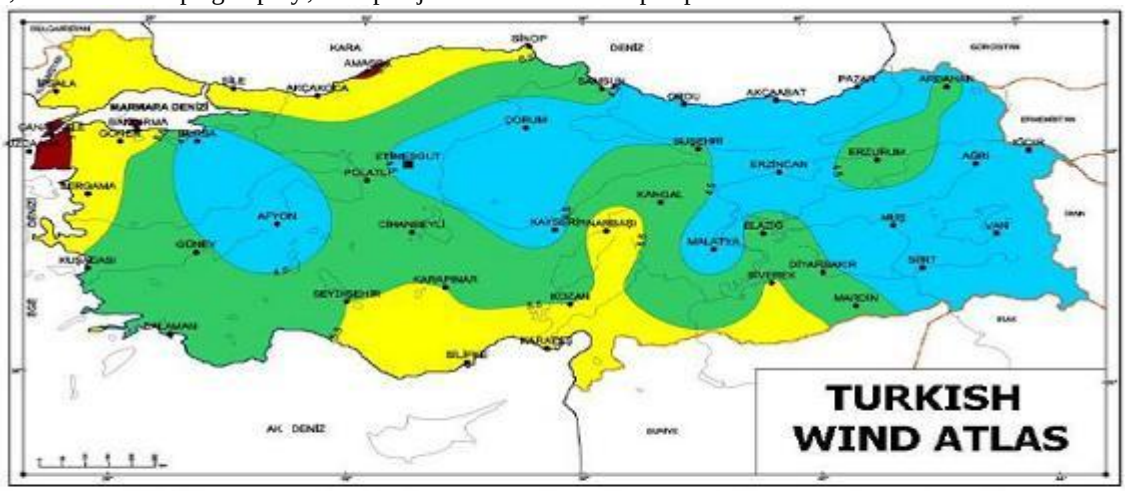
Alternative 2: Construction of a coal-fired power plant with equivalent installed capacity or annual electricity generation.

As the annual operation hours of a thermal power plant and a hydropower station differ considerably, the annual electricity generation and associated supply reliability remain incomparable in spite of their similar installed capacity. Moreover, Akim Enerji has no experience in the management of a coal-fired plant and also this kind of power plant is not aligned with its environmental policies (Please refer to ***Section 1.15***).

Hence, Alternative 2 is not a credible alternative.

Alternative 3: Construction of a new power plant generating the same annual power generation from other renewable sources such as wind power, solar power and thermal energy.

Besides hydro energy, other renewable energies such as thermal and wind energies are likely to be considered for electricity generation. However, thermal generation requires a lot of input material, which is lacking in the area where the project is located. In addition, power plants using wind energy face unattractive financial index like the proposed hydropower project; most of new wind power generation projects in Turkey are applying for a VER support, which shows that those projects are not themselves feasible and need VERs to overcome the investment barriers. In addition, due to its topography, the project area is not a proper location for a wind farm.



Wind resources at 50 m above ground level for open plains (roughness class 1)

v (m/s)	> 7.5	6.5 – 7.5	5.5 – 6.5	4.5 – 5.5	< 4.5
P (W/m²)	> 500	300 - 500	200 - 300	100 - 200	< 100

Figure 4: Turkish Wind Atlas[22]

22 Turkish State Meteorological Service http://www.meteor.gov.tr/2006/arastirma/files/TurkishWindAtlas.pdf

Consequently, Alternative 3 is not a viable alternative and should be eliminated from further consideration.

Alternative 4: The continuation of the current situation. The equivalent electricity will be provided by the existing power units connected to the national grid.

This alternative is in compliance with legal and regulatory requirements. Based on the above analysis, it is a plausible and realistic alternative.

Outcome of Sub-step 1a: Out of all the identified alternatives, only Alternative 4 and Alternative 1 are plausible and realistic.

Sub-step 1b- Consistency with mandatory laws and regulations:
As above mentioned all the alternatives available to the proposed Project that provide outputs or services comparable with the proposed VCS project activity are consistent with the mandatory laws and regulations including *Electricity Market Law*[23], *The Renewable Energy Law*[24] *and Environmental Law*[25]:

Outcome of Sub-step 1b: The only plausible and realistic alternatives are "The proposed project activity undertaken without being registered as a VCS project activity and Alternative 4 *"The continuation of the current situation. The equivalent electricity will be provided by the existing power units connected to the national grid"* Based on the above analysis, the proposed project activity is not the only alternative amongst the project participants that is in compliance with mandatory regulations. Therefore, the proposed VCS project activity may be additional.

***STEP 2* – Investment analysis**
The purpose of the investment analysis is to determine whether the proposed project activity is not:

a) The most economically or financially attractive; or
b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (VCS-VERs).

To conduct the investment analysis, the following Sub-steps were used:

Sub-step 2a- Determine appropriate analysis method
The *"Tool for the demonstration and assessment of additionality"* (Version 05.2) recommends three analysis methods, namely simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

The proposed Project generates financial and economic benefits through the sales of electricity other than Voluntary Emissions Reduction (VCS-VER) related income. Therefore the simple cost analysis (Option I) cannot be used.

Investment comparison analysis (Option II) is only applicable to projects where alternatives should be similar investment projects. The alternative baseline scenario of the proposed project is the continuation of the current situation, where the equivalent electricity will be provided by the existing power units connected to the national grid. Among the investment comparison analysis (Option II) and the benchmark analysis (Option III), the benchmark analysis (Option III) is preferred.

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

When using the benchmark analysis option, the equity IRR has been used .

According to the *"Tool for the demonstration and assessment of additionality"* (Version 05.2), in the cases of projects which could be developed by an entity other than the project participant the relevant benchmark for an Equity IRR should be based on publicly available data sources which

[23] Law Number: 4628 Ratification Date: 20.02.2001 Enactment Date: 03.03.2001
[24] Law Number: 5346 Ratification Date: 10.05.2005 Enactment Date: 18.05.2005
[25] Law Number2872 Ratification Date: 09.08.1983 Enactment Date: 11.08.1983

can be clearly validated by the DOE. The benchmark for the Equity IRR shall, therefore, 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"*[27].

For that reason, the benchmark value for the equity IRR has been selected as the Turkish Eurobonds rates, plus a risk premium as explained below.

Akım Enerji decided to invest in Kalkandere Project in 2008 and the decision was based on the the financial and technical feasibility report prepared by external advisors . This report was also submitted to DSI (State Hydrolic Works) for their approval in November 2007. Some of the assumptions used in the feasibility report are:

The technical assumptions along with construction and M&E costs are calculated per DSI and other international standards to build this size of diversion weir by an independent advisor to the project owner. The feasibility study was the base for the investment decision.

The cash flow was prepared for 35 years operational lifetime (technical lifetime of the electromechanical equipments.).

Electricity generation amount of 197.7 GWh was calculated from the inflows in the river during the years 1965 to 2003 in the technical part of the feasibility report. However it is important to underline the fact that the expected energy production dropped to 179.0 GWh due to increased minimum water amount to be released for the continuation of life in and around the river basin. Therefore, the project's feasibility negatively impacted from this last minute change. However, in order to reflect the feasibility and decision making conditions in equity IRR calculations, the electricity production figure of the project is assumed as 197.7 GWh instead of the real expected production figure of 179.0 GWh.

Electricity Selling Price was assumed to be approximately 6 USD Cents/kWh for firm energy and 3.3 USD Cents/kWh for secondary energy. However, in below equity IRR calculations, 5.5 Euro Cents/kWh (around 7.5 USD cents/kWh) was used for both primary and secondary energy sales as this is the upper limit of the guaranteed amount by the law.

Operation and Maintenance expenses were calculated according to State Hydraulic Works criteria based on their past experiences. These figures were taken from the feasibility study prepared in November 2007 by Hidro Dizayn page 9.29.

In the financial part of the feasibility report transmission line losses were considered to be 2.0% of the generated electricity from the plant based on the invoices between transmission line companies and generation companies.

Interest rate of 9.5% (all in cost) was assumed. There is no assumption mentioned in this feasibility regarding the loan maturity and debt/equity ratio due to the fact that the IRR calculations in the feasibility depends on a different method other than the methodology requirements. Therefore for the sake of IRR calculation for this PDD, the loan maturity was assumed to be 10 years with 2 years grace period for the construction. The leverage of 70% was also assumed with 30% equity contribution.

On the investment amount front, again the inputs of the feasibility study prepared by a third party consultant namely Hidro Dizayn in November 2007 were taken as the inputs to the equity IRR calculation in this PDD (Please see page 9.27 of Kalkandere Regulatoru ve Yokuslu HES Revize Fizibilite Raporu Kasım 2007) .

The benchmark was calculated as follows: As the Turkish Eurobonds represent a risk-free rate, it must be increased by a suitable risk premium, which reflects the premium that investors demand for an average risk investment. The interest rate for Eurobond with longest duration of 30 years which is US900123BB58-05.03.2038 was 8.89% at the time of decision (October 2008, please see http://www.ziraat.com.tr/tr/bankamiz/faiz-ve-ucretler/aspx/eurobond.aspx for 10th of October 2008). However the

[27] *"Tool for the demonstration and assessment of additionality" (Version 05.2), page 6, available at http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf*

maturity of this bond does not match with the investment duration which is 35 years (Technical lifetime of the elecyromechanical equipments as assumed in the feasibility report). Therefore the yield of a synthetic bond with 37 years (2 year for construction period and 35 years for operation of the project) maturity at the time of decision was calculated using the yield curve derived from http://www.ziraat.com.tr/tr/bankamiz/faiz-ve-ucretler/aspx/eurobond.aspx was used. The details of the calculation can be found in a separate excel sheet provided to DOE. Please see Annex 9 to see the yield curve. According to this calculation the synthetic bond's yield should be around 9.70% .

The list of assumptions and their sources can be found in the following table:

Parameter	Chosen Value	Source
Investment period	35 years	Technical lifetime of the electromechanical equipment (Feasibility report submitted to DSI in November 2007 page 9.1)
Annual energy production	197.7 GWh	Feasibility report submitted to DSI in November 2007 page 1.7
Electricity sales price	5.5 Euro cents /Kwh	Upper limit of the guaranteed purchase price by law number: 5346 Ratification Date: 10.05.2005 Enactment Date: 18.05.2005
O&M expenses	US$ 664,494	Feasibility report submitted to DSI in November 2007 page 9.29
Interest on loan	9.5%	Feasibility report submitted to DSI in November 2007 page 9.1
Other loan conditions	Debt to Equity: 70/30 Tenor: 10 years	General assumption by the PDD deveoper
Investment amount	US$ 68,549,025	Feasibility report submitted to DSI in November 2007 page 9.27
Euro / US$ parity	1.3694 Euro/ US$	Average parity rate in 2007 reproduced from TLUS$ and TL/Euro rates announced by Central Bank of Turkey. http://evds.tcmb.gov.tr/cbt.html

Table 5: *List of assumptions*

According to Mr. Aswath Damodara, professor of Finance at the Stern School of Business at New York University[28], the suitable risk premium for Turkey can be estimated as 12.88% for the year 2008.

The benchmark value for the equity IRR is then calculated using the interest rate delivered from the Turkish Eurobonds rates, 9.70%, plus the risk premium, 12.88 %. As explained hereunder:

$$Ce = Rf + \beta \times (Rm - Rf)$$

Where:

Parameter		Chosen Value	Source
Rf	Risk-free rate	9.70%	The yield of a synthetic bond with 37 years maturity at the time of decision was calculated using the yield curve derived from http://www.ziraat.com.tr/tr/bankamiz/faiz-ve-ucretler/aspx/eurobond.aspx was used. The details of the calculation can be found in a separate excel sheet provided to DOE. Please see Annex 9 to see the yield curve
β	Beta. Used to measure level of risk.	0.939	The average of energy companies traded in ISE 100 derived from one of the most prominenet data provider Bloomberg. Please see Annex 9 for Betas of these companies

[28] Aswath Damodaran is a Professor of Finance at the Stern School of Business at New York University, where he teaches corporate finance and equity valuation. He also teaches on the TRIUM Global Executive MBA Program, an alliance of NYU Stern, the London School of Economics and HEC School of Management. Professor Damodaran is best known as author of several widely used academic and practitioner texts on Valuation, Corporate Finance, and Investment Management.

Rm-Rf	Market equity risk premium	12.88%	http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem08.xls
Rm	Expected market return	22.58%	Please refer to below calculation.

Table 6: *Benchmark Calculation*

Rf	+	β	x	(	Rm	-	Rf	)	=	Ce
9.70%	+	0,939	x	(	22.58%	-	9.70%	)	=	21.79%

Therefore, a realistic equity benchmark IRR for this type of project should be greater than the base investment threshold (Turkish Eurobonds) plus a risk premium, which given the figures referenced, is greater than 21.79%.

Sub-step 2c. Calculation and comparison of financial indicators (only applicable to options II and III):

The parameters needed for calculation of key financial indicators are as follows:

	Data	**Unit**
Capacity	40.65[29]	MWe
Estimation of annual grid-connected power generation – Before the change in min. water amount	197.7	GWh
Estimation of annual grid-connected power generation – After the change in min. water amount	179.0	GWh
Average unit price	0.075	USD/kWh
Total investment	68,549	000 USD
Annual operational costs	664,494	000 USD
Operational life (Technical lifetim of equipments	35	years
Crediting period	20	years
Anticipated price of VCS-VERs	3.0	USD/tCO_2

Table 7: *Basic financial parameters of the proposed Project Parameter*

Based on the parameters above, the equity IRRs with and without the VCS-VERs sales revenue are calculated and shown in

	Equity IRR
Without VCS-VERs revenues	16.83 %
With VCS-VERs revenues (5 US$/ton)	17.99 %

Table 8: *Impact of VCS-VER revenues on the equity IRR.*

Table 8 shows that the equity IRR of the total investment of the proposed project without VCS-VERs sales revenue is 16.83 %, lower than the benchmark IRR of 21.79 %, which means that the proposed project activity indeed faces significant financial barriers. Therefore, the project activity is not the most economically or financially attractive choice of investment.

[29] The installed capacity figure is different than the figure mentioned in the latest license appliaction. However, for benchmark analysis the installed capacity figure at the decision making date was used. (The installed capacity of the project is 42.33 MWe)

Sub-step 2d. Sensitivity Analysis

The sensitivity analysis shall show whether the conclusion regarding the financial attractiveness is robust under reasonable variations in the critical assumptions. According to the additionality tool, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subject to reasonable variation. For the proposed project, four basic parameters have been selected as sensitive factors to check out the financial attractiveness:

- Total investment (Due to fragmented investment breakdown, investment items constituting more than 10% of the total investment amount were included in the sensitivity analysis to be on the conservative side.)
- Electricity Production[30]
- Electricity selling price
- Annual Operational costs (General Production Expenses)

Table 8 shows the variation of equity IRR when the four parameters fluctuate from -10% to +10%.

	IRR Sensitivity with Investment Costs				
Change in %	**-10%**	**-5%**	**0%**	**5%**	**10%**
Without VER	17.34%	17.08%	16.83%	16.59%	16.36%
IRR @3 US$/ton VER	18.07%	17.79%	17.52%	17.26%	17.01%
IRR @4 US$/ton VER	18.31%	18.03%	17.76%	17.49%	17.24%
IRR @5 US$/ton VER	18.56%	18.27%	17.99%	17.73%	17.47%

	IRR Sensitivity with Electricity Production				
Change in %	**-10.0%**	**-5.0%**	**0.0%**	**5.0%**	**10.0%**
Without VER	14.73%	15.78%	16.83%	17.89%	18.96%
IRR @3 US$/ton VER	15.31%	16.41%	17.52%	18.64%	19.76%
IRR @4 US$/ton VER	15.51%	16.63%	17.76%	18.89%	20.03%
IRR @5 US$/ton VER	15.71%	16.85%	17.99%	19.15%	20.31%

	IRR Sensitivity with Electricity Price				
Change in %	**-10.0%**	**-5.0%**	**0.0%**	**5.0%**	**10.0%**
Without VER	14.73%	15.78%	16.83%	17.89%	18.96%
IRR @3 US$/ton VER	15.38%	16.45%	17.52%	18.60%	19.69%
IRR @4 US$/ton VER	15.60%	16.68%	17.76%	18.84%	19.93%
IRR @5 US$/ton VER	15.83%	16.91%	17.99%	19.09%	20.18%

	IRR Sensitivity with Annual Operational Costs				
Change in %	**-10,0%**	**-5,0%**	**0,0%**	**5,0%**	**10,0%**
Without VER	16.93%	16.88%	16.83%	16.78%	16.73%
IRR @6 US$/ton VER	17.63%	17.57%	17.52%	17.47%	17.42%
IRR @7 US$/ton VER	17.86%	17.81%	17.76%	17.70%	17.65%
IRR @8 US$/ton VER	18.10%	18.05%	17.99%	17.94%	17.89%

Table 9: *IRR fluctuation*

Sensitivity analysis has been carried out for the stated costs and assumptions. It shows that under none of those scenarios the equity IRR of the project exceeds the Benchmark.

[30] Electricity generation figure was aestimated as 197.7 GWh. Although the electricity generation figure decreased to 179 GWh because of the design change in the further stages of the project, the base production is used as 197.7 GWh in the sensitivity analysis. Since the revised electricity generation figure is lower than the estimated figure in the feasibility report and the sensitivity analysis on electricity production covers the revised electricity generation figure, this value is not included to the analysis seperately.

Outcome of Step 2: Hence, the above figures have demonstrated that the project activity is not the most economically or financially attractive alternative.[31]

***STEP 3* – Barrier analysis**

Not applied.

Project Timeline and Timeline of events and actions which have been taken to achieve VCS-VER registration

Events and action	Date	Evidence
First VER consideration	July 23rd 2004	Board of Directors decision (Please refer to **ANNEX 3**)
First Feasibility report	October 2004	The feasibility Report was prepared by the third party engineering company Hidrodizayn.
First contacts with PDD consultants	October 2007	E-mail exchange and meetings with different PDD consultants (to be disclosed upon DOE request).
Last Feasibility report	November 2007	The feasibility Report was prepared by the third party engineering company Hidrodizayn.
EIA is not required decision	November 23rd 2007	Ministry of Environment and Forestry statement.
Contact with a PDD consultant	April 25th 2008	VER services proposal (Gaia)
Contact with a DOE	June 1st, 2008	E-mail exchange between Gaia and the DOE.
First discussions with financial institutions	September 2008	Meetings with local banks
Investment Decision	October 10th 2008	Board of Directors Decision
Contract signature for the construction works of Kalkandere	January 2nd 2009	Contract with Palet-Pustiler Construction Company
Contract signature for the electromechanical equipments Contract signature for electrical works	May 7th 2009	Contract with -Voith- Hydro- Indar Contract with Siemens-Türkiye
Stakeholder consultation	June 20th 2009	Please refer to ***Section 6*** *Stakeholder's comments:*
EIA approval (by the Ministry of Environment and Forestry)	July 2009	Ministry of Environment and Forestry statement.
Start of PDD elaboration	April 2010	First VER questionnaire sent by Gaia
Start of VER validation	June 2010	On-site audit by the DOE.
Commissioning of the Kalkandere power plant	November 30th 2010	Project developer statement.
Project start date	January 1st, 2011	Project developer statement.
Construction start of Kizilagac	January 2011	Contract with the construction will be signed accordingly
Expected commissioning of the Kizilagac power plant	March 2012	Project developer statement.

Table 10: *Project timeline and early consideration of carbon credits.*

[31] All financial data and calculations will be provided to the DOE.

***STEP 4* – Common practice analysis**

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

Even though Turkey has significant hydroelectric power resources, fossil fuels remain the main source of energy production in the country. Gas, oil and coal represent about 70% of total power production.

However, there are more than 100 hydropower plants, with total installed capacity of 12,878 MW generating an average of 46,277 GWh/year, which is 36% of the economically viable hydroelectric potential. 41 hydroelectric power plants are currently under construction with 3,962 MW of installed capacity to generate an average annual 9,779 GWh representing 8% of the economically viable potential.

Aware of Turkey's hydroelectric power potential, the government has financed most of the existing power plants. For instance, the State Hydraulic Works (DSI) has developed 10,380 MW (81%) out of the 12,878 MW of total installed capacity in Turkey, and also, it has built 20 of the 25 largest hydroelectric power plants.[38]

Moreover, it has put into practice the Southeastern Anatolia Project (GAP) along the basin of the Tigris and Euphrates Rivers. Under this project, which is considered one of the most ambitious water development projects ever undertaken, the Turkish government has completed 8 hydropower plants, representing 74% of total planned energy projects under the GAP scheme. The 8 power stations generated 18,700 GWh of electricity in 2005, adding substantially to the share of hydroelectricity in Turkey's energy mix.[39]

In order to promote even more the electricity generation, in March 2001, a new Electricity Market Law was enacted. This law sets the stage for liberalization of power generation and distribution activities. And, in May 2005, Turkey adopted a Renewable Energy Law, taking a first step towards the implementation of renewable energies in the country.

However, in spite of these efforts, participation of private sector in the electricity generation from hydropower plants is still a very new concept in Turkey. Facing the growing demand for electricity and lacking the capital to realize hydro investment, the State outsourced the construction of those plants through licenses. As seen in the table below[40], the number of projects that are close to completion is very low (only 57 projects out of 477 were completed more than 50% as of now). The low rate of completion of the projects confirms the barriers elaborated above and also proves that the electricity generation from HEPP business is not a common practice.

Completion Ratio (%)	Number of Facilities
>10% Completed	143
>20% Completed	108
>30% Completed	92
>40% Completed	70
>50% Completed	57
>60% Completed	40
>70% Completed	34

***Table 11**: Number of HEPP facilities completed over a certain completion ratio*

In addition, the new capacity from privately owned hydro facilities represents a friction of new facilities added to Turkey's capacity every year. As displayed in the table below, on average, the new privately owned hydro facilities represents only 2.3% of new additions. Similarly, new

[38] "DSI in brief- General Directorate of State hydraulic works (DSI) 1954-2007", page 28 *http://www.dsi.gov.tr/english/dsi_in_brief2007.pdf*

[39] http://www.eia.doe.gov/cabs/Turkey/Electricity.html

[40] *http://www.epdk.gov.tr/lisans/elektrik/ilerleme_proje.htm (Accessed on 3 September 2009)*

additions from privately held hydro projects represents only 0,1% of Turkey's installed capacity in the last 6 years.

	2007	2006	2005	2004	2003	2002
Total Additional Installed Capacity from Private Hydro* (MW)	36,1	105,4	45,6	9,5	36,6	28,0
Total Additional Installed Capacity (MW)	1.059,6	1.817,6	2.019,5	1.236,9	3.741,3	3.513,4
Turkey's Total Installed Capacity	40.835,7	40.564,8	38.843,5	36.824,0	35.587,0	31.845,8
Private Hydro / Total Addition	3,4%	5,8%	2,3%	0,8%	1,0%	0,8%
Private Hydro / Total Capacity	0,1%	0,3%	0,1%	0,0%	0,1%	0,1%

**: Excluding Concessionary Rights and BOT Projects*

Source:
http://www.teias.gov.tr/ist2007/8.xls
http://www.teias.gov.tr/ist2006/8.xls
http://www.teias.gov.tr/istatistik2005/7.xls
http://www.teias.gov.tr/istat2004/7.xls
http://www.teias.gov.tr/istatistik/7.xls

***Table 12:** Annual privately held hydro projects' capacity additions, total additions and total installed capacity.*

In addition to this the project is comprised of two seperate power houses whereas the project employes only one weir. This is a rare project application in the region (Blacksea) where the projects have only one power houses in general. This characteristic of the project differentiate the project from other similar activities (HEPP projects) as far as the operation management and construction issues are concerned. .

All in all, the low rate of completion of the projects and the low contribution privately held hydro projects confirm the barriers elaborated above and also proves that the electricity generation from HEPP business is not a common practice. Therefore Step 4 is satisfied

Sub-step 4b- Discuss any similar Options that are occurring:

Kalkandere HEPP is located in Rize province of Turkey. Considering the HEPP projects which are under construction, there are only 5 similar projects in installed capacity (between 40 – 50 MW, except Kalkandere HEPP) in Eastern Black Sea river basin[41] in which Rize province exists, according to the information on EMRA website.[42] Eastern Black Sea river basin covers Rize, Trabzon, Gumushabe, Ordu and Giresun provinces. All the similar projects are run-off-river type hydro projects and private sector investments. However, it is not possible to compare all these projects with the subject project in respect to carbon revenues. There is no detailed information accessible for the similar projects if they benefit from carbon revenues or not, since there is no registration authority in the host country to apply for this information. Nonetheless, it is known that Kayakopru HEPP was developed as a VER project. Also, when the completion rates of the similar project activities are considered, it is seen that except Kayakopru, the completion rates of the projects are less than %50.

[41] Eastern Black Sea River Basin is selected as "the region" for Common Practice analysis, since the geographical conditions (precipitation and water flow regimes) are similar for the rivers in the same river basin.
[42] http://www2.epdk.org.tr/lisans/elektrik/ilerleme_proje.htm

No	Company	Project	Location	Type	Installed Capacity (MWm)	Annual Electricity Generation (kWh/yıl)	Completion Rate (%)
1	Arsan Enerji A.Ş.	Kayaköprü HEPP	Giresun	Run-off-river Hydro	40,2	132.781.000	72,7
2	Ayen Enerji A.Ş.	Paşalar HEPP	Rize	Run-off-river Hydro	41,5	151.309.000	-
3	Ayen Enerji A.Ş.	Büyükdüz HEPP	Gümüşhane	Run-off-river Hydro	48,8	130.886.000	44,6
4	İyon Enerji Üretimi Sanayi ve Ticaret A.Ş.	Koçlu HEPP	Giresun	Run-off-river Hydro	46,2	171.700.000	0,2
5	NİSAN Elektromekanik Enerji Sanayi ve Ticaret Ltd. Şti.	Umut HEPP	Ordu	Run-off-river Hydro	44,1	124.894.000	39,8

Table 13: *Similar Project Activities in the Region.*

As a result, less similar projects and low rate of completions show that the project is not a common practice. Therefore, nowadays, the VCS-VER project activity is the most suitable solution to increase the project's financial attractiveness and raising it to a reasonable level.

All in all the results of sub-step 4a and sub-step 4b clearly mention that the project is not a common practice.

Impact of VCS-VER income

This section has clearly explained how the approval of the project as a VCS activity, and the attendant benefits and incentives derived from the project activity, will alleviate the barriers illustrated above, and thus enable the project to be undertaken.

As shown in Step 2 and Step 3 above, the project is unlikely to move forward without the additional financial support of the VCS-VER.

The financial benefit from the revenue obtained by selling the CO_2 emissions reductions has been one of the key issues encouraging investment in the proposed project activity (Please refer to **ANNEX 3**). In fact, it is a necessary factor to drive the loan acceptance, as it is shown in the letter from the bank (Please refer to **ANNEX10**).

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

The approved baseline and monitoring methodology ACM0002-Version 12*: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" ("ACM0002") is applied*[43].

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

The purpose of the monitoring plan is to ensure that the monitoring and calculation of emission reductions of the proposed Project within the crediting period is complete, consistent, clear and accurate.

The project is operated by Akim Enerji which ensures the overall site management in accordance with Turkish Laws and technology providers' guidelines.

The monitoring will be performed in-house by the project proponent:

[43] Available at: http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_YOYKBRCBIK7TSPSB7MQT75SPX75PE8

1. *Electrical Engineers* will undertake the specific actions required by the monitoring plan, i.e. they will measure the electricity generation, the electricity supplied to the Turkish grid by the power plant, the electricity imports and the amount of fuel consumed, if fuel is consumed.
2. *Mechanical Engineers* will ensure that all the instrumentations and devices to perform the monitoring are working properly.
3. *Accounting Manager* will be in charge of providing the electricity sales receipts to the Operations Manager of the plant.
4. *Operations Manager* will be the VER coordinator. He will be in charge of:
   a) Ensuring that instrumentations and devices are available and properly suited to perform efficiently the monitoring.
   b) Communicating and coordinating the monitoring tasks of all business units.
   c) Developing, executing, analyzing and improving the VER Monitoring/Reporting Procedures. This includes the crosschecking and consolidation (with multiple sources whenever possible) of the data obtained from the electrical engineers and the accounting manager. He will also record this operation properly to be able to provide it to the DOE during the verification process.
   d) Calculating and report the emission reductions, and
   e) Organizing in-house seminars to inform and train the company staff to the monitoring procedures.

Please refer to *Figure* 8 where the site organizational chart is presented.

In order to verify the generated units of emission reductions, the VER coordinator, Mr. Mehmet TURKMEN (Operation Manager) will prepare an annual Report of Vigilance of the Project, in which the following important aspects will be included:

- Year
- Net electricity supplied by the project activity to the grid (in MWh)
- Annual gross electricity generation(in MWh)
- Annual electricity consumption (in MWh)
- Calculation of the emissions reductions: ERs per year (in tCO_2e/yr) produced from the activity of the project

After the proposed Project is registered and begins its operations, the monitoring report will be submitted at the end of every year for the verification of DOE. The report will cover the monitoring of grid-connected power generation, check report, report on calculation of the emission reductions and records of monitoring instrument repair and calibration, etc.

Data will be recorded for each crediting period and maintained at least 2 years after its end. The company will establish a dedicated maintenance system to ensure the data availability for the required period.

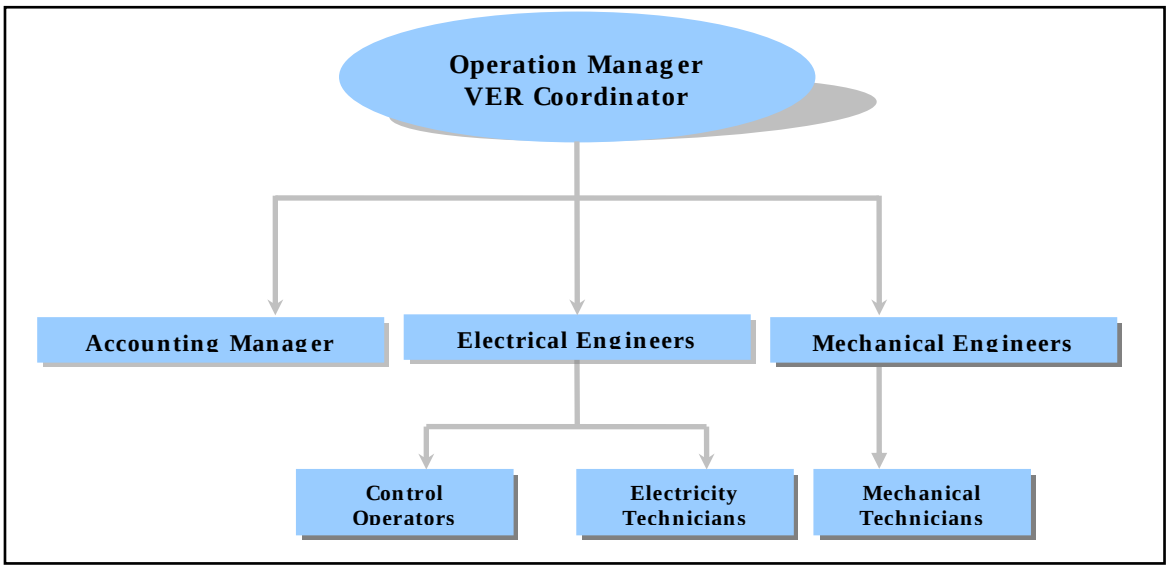


Figure 5: *Site Organizational Chart*

Measuring

The Electrical Engineers will obtain the readings from the meters, will report them in a spreadsheet (for measurement control and will store the data discharged from the meters electronically.

The project's electricity production will be fed into the grid through a transformer station which will be used by Kizilagac Power Plant and Kalkandere Power Plant.The project owner had not completed the selection process of the electricity measuring equipment but the so-told equipment should be in line with the EMRA requirements. The recalibration of these equipments will be done in line with the equipment requirements but re-calibration periods are defined by national metrology institutes country by country and in Turkey this period is defined as 10 years. [44]

As mentioned above there will be two sets of meters in the transformer station. (The meters are electronic meters with an accuracy class of 0.2.) One of is the main meter for measuring and the other is the check meter for control. Both of these meters are metering the energy in two directions (consumption and production). If there is a measuring difference between these two meters and one of the parties (TEIAS or the company) requests for calibration of the meters, in this case, the meters will be calibrated without waiting for the periodic calibration date. (TEIAS System Usage Agreement, Art 3, B./2./b))[45] This calibration process is done by another third party under the control of TEIAS. The company is not responsible for calibration of the meters in Turkey according to the local standards.

All production figures which are subject to sales to the grid are agreed with PMUM (Market Financial Reconciliation Center). These figures can be accesses from PMUM's web site by the seller. Therefore, net electricity production figures[46] announced by PMUM will be used in emission calculation figures. These figures will also be cross checked with the production and internal electricity usage figures provided from the Montly Meter Reading Protocols.[47]

The Electrical Engineers will receive sufficient and continuous training in terms of monitoring and verification on aspects such as meter's reading and calibration and reading's recording, adjustment and reporting every year. If new personnel are hired, they will have to follow up a training program and will be trained in the specific skills required to carry out the Monitoring Plan.

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Data / Parameter:	**$EG_{facility,y}$**
Data unit:	**MWh/yr**
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data to be used:	Project activity site.
Value of data applied for the purpose of calculating expected emission reductions	179,050 MWh/yr (Please refer to ***Section 1.9***).

[44] http://www.mevzuat.adalet.gov.tr/html/21179.html
[45] www.teias.gov.tr/sistemkullanim1.doc
[46] Net electricity production figure = Electricity generation (operation base) – Electricity traction from grid
[47] Monthly Meter Reading protocols are the protocols which are filled in by the TEİAŞ responsible according to the monthly electricity measurements in the power plant and these protocols are signed and kept by both parties (TEİAŞ and the company). The protocol includes the measurement values of meters for previous and last readings and shows the electricity delivered to the grid and electricity traction from the grid by the project. The difference between the delivered and tractional electricity corresponds to the "net electricity delivered to the grid" which is used for the emissioj reductions calculation.

Description of measurement methods and procedures to be applied:	Electricity meters in the powerhouse.
Monitoring frequency:	Continuous measurement and at least monthly recording.
QA/QC procedures to be applied:	Cross check measurements results with records for sold electricity. Calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately.
Any comment:	**-**

Data / Parameter:	**Cap_{PJ}**
Data unit:	**MWe**
Description:	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data to be used:	Project site.
Value of data applied for the purpose of calculating expected emission reductions	42.33
Description of measurement methods and procedures to be applied:	The installed capacity will be determined based on recognized standards.
Monitoring frequency:	Yearly
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**A_{PJ}**
Data unit:	**m^2**
Description:	Area of the regulation pond measured in the surface of the water, after the implementation of the project activity. when is full
Source of data to be used:	Project site.
Value of data applied for the purpose of calculating expected emission reductions	2,205
Description of measurement methods and procedures to be applied:	Measured from topographical surveys, maps, satellite pictures, etc
Monitoring frequency:	Yearly
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	**TJ**
Description:	Heating values of fuels consumed in thermal power plants in Turkey by the electric utilities.
Source of data to be used:	TEIAS website: "Heating Values of Fuels Consumed in Thermal Power Plants in Turkey by the Electric Utilities" 2006-2008: http://www.teias.gov.tr/istatistik2008/46.xls
Value of data applied for the purpose of calculating expected emission reductions	Please refer to ***ANNEX 5***
Description of measurement	

methods and procedures to be applied:	
Monitoring frequency:	Once for each crediting period.
QA/QC procedures to be applied:	
Any comment:	Values are given in Tcal and where converted using to TJ using a conversion factor of 4.1868TJ/Tcal.

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 to be used:	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value of data applied for the purpose of calculating expected emission reductions	Please refer to ***ANNEX 5***
Description of measurement methods and procedures to be applied:	-
Monitoring frequency:	Once for each crediting period.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**Electricity capacity additions**
Data unit:	MW
Description:	Power plants which are most recently taken into operation
Source of data to be used:	TEIAS website: http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202005.pdf http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202006.pdf http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202007.pdf http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2008.pdf http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf
Value of data applied for the purpose of calculating expected emission reductions	Please refer ***ANNEX 5***
Description of measurement methods and procedures to be applied:	-
Monitoring frequency:	Once for each crediting period.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**$\eta_{m,y}$**
Data unit:	**%**
Description:	Average net energy conversion efficiency of power unit *m* in year *y*
Source of data to be used:	UNFCC web site: "Tool to calculate the emission factor for an electricity system". Annex 1.
Value of data applied for the	Please refer to ***5***

purpose of calculating expected emission reductions	
Description of measurement methods and procedures to be applied:	
Monitoring frequency:	Once for each crediting period.
QA/QC procedures to be applied:	
Any comment:	No official efficiency values based on each power plant or each fuel type is available in Turkey Most natural gas power plants in Turkey are combined cycle, most coal power plants operate sub-critical and most liquid fuel power plants adopt an open cycle technology.

Data / Parameter:	**$EF_{grid,CM}$**
Data unit:	**tCO_2/MWh**
Description:	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the *"Tool to calculate the emission factor for an electricity system"*
Source of data to be used:	TEIAS and IPCC default values.
Value of data applied for the purpose of calculating expected emission reductions	0.559
Description of measurement methods and procedures to be applied:	Calculated as per ACM0002 with 3 years vintage data and option of ex ante calculation based on "50% of OM and 50% of BM values approach for the first crediting period"
Monitoring frequency:	This value will be updated at the beginning of each new crediting period.
QA/QC procedures to be applied:	As per *"Tool to calculate the emission factor for an electricity system"*
Any comment:	.

3.4 Description of the monitoring plan

All data collected as part of monitoring plan is indicated in Section 3.3. They will be archived electronically and be kept at least for two years after the end of the last crediting period.

Please refer to ***Section 3.2*** for details on the Monitoring Plan.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

The method used is the approved baseline and monitoring methodology ACM0002- Version 12*: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" ("ACM0002"*), as explained in ***Section 2.2***.

In line with the application of the methodology the emission factor for grid electricity is calculated as per the procedures detailed in the *"Tool to calculate the emission factor for an electricity system"* (Version 02)

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

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

power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

BE_y	Baseline emissions in year y (tCO_2)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y(MWh/yr)
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the *"Tool to calculate the emission factor for an electricity system"*

Calculation of $EG_{PJ,y}$

Since the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity:

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

Where:

$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y (MWh/yr)
$EG_{facility,y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).

Calculation of $EF_{grid,CM,y}$

According to the *"Tool to calculate the emission factor for an electricity system"*, Project participants shall apply the following six steps:

STEP 1. Identify the relevant electric power system.
STEP 2. Choose whether to include 0ff-grid power plants in the project electricity system
STEP 3. Select a method to determine the operating margin (OM)
STEP 4. Calculate the operating margin emission factor according to the selected method
STEP 5. Identify the group of power units to be included in the build margin
STEP 6. Calculate the build margin emission factor
STEP 7. Calculate the combined margin (CM) emissions factor.

STEP 1: Identify the relevant electricity system

The project electricity system is defined as "the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints" in the "Tool to calculate the emission factor for an electricity system, Version 02" page 3. Similarly, "a connected electricity system, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint" in the same document."

In the project's case "the project electricity system" and "the connected system" are same. As also confirmed by TEIAS (Turkish Electricity Transmission Company Inc.), the Turkish transmission system is interconnected. There is an independent regional grid system neither in Rize nor in Black Sea Region.

In addition to this, since there is no DNA in the host country to delineate the project electricity system, the suggested criteria in "Tool to calculate the emission factor for an electricity system,

Version 02" was used. According to this, 1-The capacity usage figure for the transmission line should be checked. 2-Spot market prices of different systems in the country should be compared.

Since there is no capacity usage figure for transmission line published, the criteria "The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year." could not be proved.

On the other hand, there is no spot electricity market available in the country as suggested in the other criteria "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." Therefore, this criterion is not applicable as well.

As suggested in "Tool to calculate the emission factor for an electricity system, Version 02", "if these criteria do not result in a clear grid boundary, use a regional grid definition in the case of large countries with layered dispatch systems (e.g. provincial / regional / national)." However, there are no layered dispatch systems in the host country. As a result the national grid was used as the project electricity system. Hence, the estimation of OM (Operating Margin) and BM (Built Margin) are based on the definition of the Turkish electricity network as one single interconnected system.

STEP 2: Choose whether to include 0ff-grid power plants in the project electricity system

According to "Tool to calculate the emission factor for an electricity system, Version 02", the OM and BM values can be calculated based on the following two options:

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.

Option I is selected in the calculation of Built Margin and Operating Margin for the proposed project activity. The reason why the tool suggests the Option II is, "in some countries off-grid power generation is significant and can partially be dispatched by CDM project activities, e.g. if off-grid power plants are operated due to an unreliable and unstable electricity grid."

As Turkey's grid is more appropriate for calculating the OM and BM values according to Option I, this option is selected.

STEP 3: Select a method to determine the operating margin (OM)

According to "Tool to calculate the emission factor for an electricity system, Version 02", four alternative methods to calculate OM can be chosen.

(a) Simple OM
(b) Simple adjusted OM
(c) Dispatch data analysis OM
(d) Average OM

In choosing the right method for the calculation of OM, "Simple adjusted OM", "Dispatch data analysis OM" and "Average OM" methods are eliminated since all these methods require power plant specific information of power plants which are connected to the grid. Therefore, "Simple OM" method is selected.

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

The "Simple OM" metdod may be calculated:

Option A: Based on the net electricity generation and a CO2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system

However, no power plant specific information is available. On the other hand, Simple OM may only be used if:

(a) The necessary data for Option A is not available; and
(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
(c) Off-grid power plants are not included in the calculation

In Turkey, there is no plant specific CO2 emission factors which is required to use Option A for the OM Calculations. On the other hand, Simple OM is eligible when low cost and/or must run resources constitute, as an average of the five most recent years, less than 50 percent of the total generation for the grid. Nevertheless, the only relevant low operating cost and must run resource in Turkey is hydropower because the share of all other renewable resources is close to nil and therefore can be assumed negligible. The share of all non-hydro renewable resources in the entire electricity generation is 0,5 percent for the years between 2003 and 2008. There is no example of coal being used as must-run and nuclear energy is not practiced in Turkey.

As depicted in Table 10[48] the share of low-cost/must run resources were never higher than 50 percent in the last five years.

	2003	2004	2005	2006	2007	2008
Turkey's Gross Electiricity Production (GWh)	140.581	150.698	161.956	176.300	191.558	198.418
Electricity Production From Hydro (GWh)	35.330	46.084	39.561	44.244	35.851	33.270
Share (%)	25,1%	30,6%	24,4%	25,1%	18,7%	16,8%

***Table 14**: Share of hydroelectric production in Turkey, 2003 – 2008*[49]

In addition, there is no off-grid power plants in Turkey.

All in all, Option B of "Simple OM" method was adopted as "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" is the only available data in the host country.

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

The Simple Operating Margin Emission Factor ($EF_{OM,y}$) is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must run power plants/units as determined by the Baseline Methodology.

According to "Tool to calculate the emission factor for an electricity system, Version 02", the formula given below is applied for computing the $EF_{grid,OMsimple,y}$.

Option B – Calculation based on total fuel consumption and electricity generation of the system:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y}$$

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
FCi,y	=	Amount of fossil fuel type i consumed in the project electricity sys in year y (mass or volume unit)
NCVi,y	=	Net calorific value (energy content) of fossil fuel type i in year y ((mass or volume unit)

48 All data presented in the baseline calculations are provided from official sources as mentioned in related footnotes.Therefore, uncertainities of data sets were not estiamted.
49 http://www.teias.gov.tr/istatistik2008/32(75-08).xls

$EFCO_2,i,y$	=	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EGy	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i	=	All fossil fuel types combusted in power sources in the project electricity system in year y
y	=	Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

In order to calculate the emission amounts from each fuel types, emission factors from IPCC website were used.[50] Three sets of emission factors were identified as minimum, medium and maximum values. To be conservative side, the minimum values are used in the OM calculations.

	kg CO2/GJ			Default Carbon Oxidation Factor
	min	mid	max	
hard coal	92,8	96,1	100,0	1,0
lignite	90,9	101,0	115,0	1,0
fuel oil	75,5	77,4	78,8	1,0
diesel oil	72,6	74,1	74,8	1,0
natural gas	54,3	56,1	58,3	1,0
lpg	61,6	63,1	65,6	1,0
naphta	69,3	73,3	76,3	1,0

Table 15: *Emission factors from IPCC*

Turkey's GHG Emissions Inventories for year 2006 and 2007 are announced by Turkish Statistical Institute (TUIK). However, to be on the conservative side, CO_2 emissions figures from electricity production are not taken from these announced figures, as the calculation method is not known and these figures are a bit higher than the calculated figures.[51, 52], [53] As a result, for years 2006, 2007 and 2008, the CO_2 emissions are calculated with the IPCC minimum values:
All in all;

	2006	2007	2008
CO_2 Emmission from Electricity Production (tons)	83.173.585	98.352.660	104.062.368

Table 16: *CO_2 Emission of Turkey from Electricity Production*

The calculation of net electricity production is demonstrated below. [54] As the efficiency factor from gross to net electricity for thermal resources is not known, the overall relation between gross and net electricity production is assumed to be the same for thermal production. Table 13 shows the overall gross/net relation where the estimated net electricity production from thermal resources were calculated by using the same relation.

[50] http://www.ipcc-nggip.iges.or.jp/EFDB/find_ef_s1.php
[51] http://www.tuik.gov.tr/PreHaberBultenleri.do?id=1996
[52] http://www.tuik.gov.tr/PreHaberBultenleri.do?id=4078
[53] http://www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=488
54 http://www.teias.gov.tr/istatistik2008/30(84-08).xls

	2006	2007	2008
Gross Electricity Production (a)	176.300	191.558	198.418
Net Electricity Production (b)	169.543	183.340	189.762
Net/Gross (c= a/b)	0,962	0,957	0,956
Gross Electricity Production from thermal sources (d)	131.835	155.196	164.139
Net Electricity Production from thermal sources (c*d)	126.783	148.538	156.979

Table 17: *Net Electricity Production of Turkey from Thermal Sources*

Obviously, using the same relation for both overall electricity production and thermal production is an approximation based on a rough assumption. Yet, obviously, such assumption results in a very conservative estimation because the efficiency of thermal plants is much lower than other plants as the operational consumption in those plants are relatively higher and this would only lead to a lower net electricity generation with higher OM emission factor and higher emission reductions.

With respect to the Baseline Methodology, electricity import amount is added to the domestic supply where the imports from connected grids located in other countries are weighted with an emission factor of zero tCO_2/MWh.

The last part of Step 1 is calculating the ratio of emissions and generation. Based on the Simple Operating Margin Emission Factor formula, $EF_{OM,y}$ values for last three years are calculated as follows:

	2006	2007	2008
OM (MWh/tCO_2)	0,657	0,663	0,664

Table 18: *OM Emission Factor for 2006 – 2008*

According to the methodology, two data vintages are allowed for the calculation of the OM emission factor, ex-ante and ex-post:

- Ex-ante: A 3-year average, based on the most recent statistics available at the time of PDD submission
- Ex-post: The year in which project generation occurs, if the OM emission factor is updated based on ex-post monitoring

In this case, the ex-ante approach is preferred because the data is available and it is a conservative approach due to the forecast that the weight of fossil fuel use in the generation of electricity in Turkey will increase.

As the weighted average of the figures between 2006 and 2008 is computed, the OM emission factor is 0.661 tCO2 / MWh.

STEP 5: Identify the group of power units to be included in the build margin

Computing the BM is based on the sample of plants, in either of the two proposed ways:

(a) The set of five power units that have been built most recently, or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Among these two options, the sample group that comprises the larger annual generation should be used.

The data for the recently built power plants is available for their capacity, type of utility in terms of IPP, auto-producer, BOT, fuel type and date of commissioning. According to the data:

- The total annual production of the five plants that have been built most recently is 1,842.3 GWh. Such capacity represents approximately 0,93 percent of the overall electricity generation capacity in Turkey which is in the amount of 198.4 TWh. Obviously, this is far below the 20 percent threshold proposed by the methodology.
- Instead, the Build Margin could also be computed by using the most recent capacity additions that comprise the 20 percent of the total system generation. This corresponds to 39.7 TWh which is 20 percent of the overall generation of 198.4 TWh.

The table in Appendix 4 displays the details of generation from those plants in specific.

STEP 6: Calculate the build margin emission factor

According to the Baseline Methodology, the Build Margin (BM) Emission Factor EF_{BM} is calculated as the generation-weighted average emission factor of a sample of power plants m for a specific year, as follows:

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

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh);
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

There is no available CO_2 emission data for the power units included in the BM calculation. The available data for on plant basis is the name, type, installed capacity and annual electricity production figures of these facilities. However, there is no available data for the electricity production figures of some small facilities, most probably because these projects are included in the "Other Projects". Therefore, annual electricity productions of these facilities were calculated with the following formula unless the exact production figures are reached. The data used in the BM calculation is provided from the Turkey's Capacity Projection Reports published in years: 2009[55], 2008[56], 2007[57], 2006[58] and 2005[59].

$EG_{m,y}$= Full Load Working Hours x Installed Capacity

In addition to this, the efficiency rates for the fuel consumption of these facilities should be added to the calculation (as the thermal plants do not consume 100% of the fuel which they are fed with). Within the context of the calculation in this document, higher the efficiency figure means lower the CO_2 emissions (as the electricity calculation assumes that the electricity production is a function of the designed installed capacity not the efficiency. However, in theory the installed capacity of a plant increases with the higher efficiency).

Therefore, in the calculation of the $EF_{grid,BM,y}$, first $EF_{EL,m,y}$ values are calculated by using the formula (4) as suggestd in the tool. Also, to calculate the $EF_{EL,m,y}$ values, the default efficiency figures listed under the "Appendix-1: Default efficiency factors for power plants" are used.

55 http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf

56 http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2008.pdf

57 http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202007.pdf

58 http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202006.pdf

59 http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202005.pdf

Grid Power Plants		
Generation Technology	**Old Units (before and in 2000)**	**New units (after 2000)**
Coal	-	-
Subcritical	37%	39%
Supercritical	-	45%
Ultra-upercritical	-	50%
IGCC	-	50%
FBS	35,5%	-
CFBS	36,5%	40,0%
PFBS	-	41,5%
Oil	-	-
Steam turbine	37,5%	39%
Open cycle	30%	39,5%
Combined cycle	46%	46%
Natural Gas	-	-
Steam turbine	37,5%	37,5%
Open cycle	30%	39,5%
Combined cycle	46%	60%

Table 19: *Default Efficiency Factors for power plants (Appendix 1 of the tool)*

As seen in the table above, the efficiency figures of coal, oil and natural gas, for different generation technologies, are given in the tool. In Turkey, the generation technologies for natural gas and oil is "Combined cycle" and for coal "Subcritical". Since the default values for lpg and naphta are not given in the tool, to be on the conservative side, the efficiency factors of these fuel types are assunmed as 60% (equal to the highest efficiency figure / Efficiency figure for Natural Gas-Combined Cycle).

As a result, in line with the tool, the efficiency factors for each fuel type are assumed as presented in the table below:

Fuel Type	Generation Technology	Efficiency Factor
hard coal	Coal - Subcritical	39%
lignite	Coal - Subcritical	39%
fuel oil	Oil - Combined Cycle	46%
diesel oil	Oil - Combined Cycle	46%
natural gas	Natural Gas - Combined Cycle	60%
lpg	Natural Gas - Combined Cycle	60%
naphta	Natural Gas - Combined Cycle	60%

Table 20: *Efficiency Factors used for BM Emission Factor Calculation*

The Build Margin estimation is based on the emission factors calculated for each energy source.

Fuel Specific Emission Factors

Carbon content factors for each fuel type (tC/TJ) refer to the factors stated in "2006 IPCC Guidelines for National Greenhouse Gas Inventories" and the fuel specific CO_2 emission factors were estimated from the same factors. To be on the conservative side, minimum emission factors were used in the calculation.

Electric Efficiency Rates

Default effficency factors given in the tool. (Please see table 19)

Equivalent Electricity Generation

The equivalent electricity generation for each fuel type j out of the most recent 20 percent plants is calculated as follow:

Average Running Hours (Hours): For each specific fuel type, average running hours of similar facilities in Turkey for the year 2008, 2007, 2006 and 2005. Relevant figures were calculated based on the installed capacity and electricity production figures. On the other hand EUAS announces the electricity production figures of its facilities in each year. For these facilities actual figures were used.

Installed Capacity (MW): Total installed capacities of facilities run by similar fuel types for the period between January 8th, 2004 and December 31st, 2008.

Electricity Production (GWh): The announced electricity production figures of the facilities which were commissioned in the period between January 8th, 2004 and December 31st, 2008. And, multiplication of running hours and installed capacity for each fuel type, unless the energy production figures are not reached.

The computations display a weighted Build Margin emission factor of 0.457 tCO_2 / MWh..

STEP 7: Calculate the combined margin emissions factor

The baseline emission factor is the weighted average of the Operating Margin Emission Factor and Build Margin Emission Factor. The ACM0002 / Version 12 guideline recommends equal weight values for hydropower projects as seen in the formula below:

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

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 (%)

The default values recommended by Methodological tool: "Tool to calculate the emission factor for an electricity system, Version 02" for w_{OM} and w_{BM} for activities other than wind and solar power generation projects are 0.5 and 0.5, respectively.

$EF_{grid,\,CM,\,y}$ = 0.661 x 0.5 + 0.457 x 0.5

Therefore resulting $EF_{grid,CM,y}$ is 0.559 tCO_2/MWh

All in all, the expected emission reduction of the project is as following:

Year	Annual estimation of emissions reductions in tonnes of CO_2e
2011	79,545
2012	97,444
2013	100,089
2014	100,089

2015	100,089
2016	100,089
2017	100,089
2018	100,089
2019	100,089
2020	100,089
Total estimated reductions (tonnes of CO_2)	**977,701**
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	97,770

4.3 Quantifying GHG emissions and/or removals for the project:

According to the ACM0002, the generic equation for the calculation of emission reduction is:

$$ER_y = BE_y - PE_y$$

Where:

ER_y Emission reductions for the year y (tCO_2)
BE_y Baseline emissions for the year y (tCO_2)
PE_y Project emission for the year y (tCO_2)

Project emissions
The project emissions shall be accounted using the following equation:

$$PE_y = PE_{EF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

PE_y Project emissions in year y (tCO_2e/yr)
$PE_{FF,y}$ Project emissions from fossil fuel consumption in year y (tCO_2/yr)
$PE_{GP,y}$ Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO_2e/yr)
$PE_{HP,y}$ Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

Fossil fuel consumption ($PE_{FF,y}$)
The project internal consumption is approximately 500 kVA, which can be considered negligible. This consumption will be satisfied from the electricity generation when the plant is in operation or from the grid when the plant is not in operation. Eventually, if there is no electricity available in the grid and the plant is not in operation the internal consumption will be satisfied from a diesel generator, but this would rarely occur. If diesel engines would be used, emissions associated would be calculated according to the *"Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"* and considered as project emissions. Therefore:

$PE_{FF,y} = 0$

Emissions of non-condensable gases from the operation of geothermal power plants ($PE_{GP,y}$)
Since the project activity does not involve the operation of a geothermal power plant,

$PE_{GP,y} = 0$

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)
The project activity is a Greenfield run-of–river hydropower project. The water is diverted using a diversion wall structure to power canal and then to the powerhouse. The water will be fed back to river through the tailrace canal. The diversion structure result in a regulation pond with a surface

area of 14 091 m^2, that does not affect in any way the volumes of existing reservoirs downstream of the project. (Please refer to **Hata! Başvuru kaynağı bulunamadı.**3)

The power density (PD) for this regulation pond is calculated as follows:

PD 43,470,000 W / 2 205 m^2
PD = 19,714.28W/m^2
PD > 10 W/m^2
Therefore, $PE_{HP,y}$=0

Hence, PE_y= 0

Leakage emissions

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing and transport). These emissions sources are neglected.

Please refer to ***ANNEX 5*** for details of all baseline related calculations.

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

According to ***Section 4.3*** the emission reductions (ER_y) are equal to baseline emissions of the same year.

The following table shows the ex-ante emission reductions calculations:

Total installed capacity	43.47 MW
Net electricity delivered to the grid (EG_y)	179,050 MWh
Baseline emission factor (Combined Margin) of Turkish grid (EF_y) $EF_y = W_{OM} * EF_{OM,y} + W_{BM} * EF_{BM,y}$	**0.5*0.661+ 0.5*0.457 = 0.559 tCO_2/MWh**
Baseline emissions (BE_y)	**tCO_2/year** **179,050 * 0.559=100,089 tCO_2/year**
Project emissions (PE_y)	0 tCO_2/year
Leakage emissions (LE_y)	0 tCO_2/year
Emission reduction (ER_y)	**100,089 tCO_2/year**

Table 21: *Ex-ante emission reductions calculations*[60]**.**

5 Environmental Impact:

The project had received an "EIA is not reuired" title from Ministry of Environment of Turkey. With this title the project is allowed to start its construction works and begin operations after the commencement of the project. However, the project owner had also prepared an EIA report to understand whether the project really has an irreversible major environmental effect. Hence, an EIA report has been carried out and it has concluded that the project activity will not lead to significant negative impacts. Furthermore, it will contribute to improve the environmental situation in the region and in the country. Avoiding fossil fuel-based electricity will enhance the

[60]Transmission & distribution losses are neglected in the emission reduction calculations as required by the methodology.

air quality and help to reduce the adverse affects on the climate. Renewable technologies for the electricity generation will be introduced and sustainable development will be promoted.

The EIA report did not only assess the environmental impacts but it also presented a monitoring plan to be implemented during construction and operation phases. Therefore, the project will voluntarily prepare monitoring forms and these forms will be presented to the Ministry within periods of three months.

A summary of the potential negative environmental impacts and measures to be taken by the project participant to mitigate them is presented as follows:

Possible impacts during the construction activities
According to the environmental impact studies, the implementation of the project activity is not considered to be present any significant risks for human health or the environment.

It is possible that the traffic increase due to transportation of the construction materials, access of personnel and heavy construction equipment causes traffic accidents. This will be prevented by training the personnel, speed limitation, putting traffic signs and periodical maintenance and control of the vehicles.

The emissions from all the machines used during the construction phase will be measured periodically and the machines will be maintained if required. The vehicles carrying the excavation material will be covered and the internal roads will be watered periodically.

To minimize the possible work accidents, qualified personnel will be hired and will be continuously trained for work safety. Also, the personnel will be equipped with personnel protection equipments required by Turkish Labour Safety Regulations and appropriate healthcare and labour safety conditions will be provided.

It is worth noticing that Kalkandere's civil contractor has been certified ISO 9001:2000. Therefore, a quality management system will be applied to all the activities to be held during the construction phase.

Impacts on the aquatic life
The impact on aquatic life will be managed by the installation of a fish passage to provide an upstream and downstream movement. Its design was based on the study of the fish species, their size, migration season and the river's annual flow rates.

Impacts on the landscape
In order to prevent erosion in the slopes and to form a security band, reforestation works will be carried out under the control of the Environment and Forestry Directorate and Operational Directorates. The species that will be used are local species.

Noise impacts
The noise level of Kalkandere Power Plant is estimated to be negligible. Also, the noise impacts from the studies on the surface will be minimized by limiting the activities to the daytime and by warning the local residents.

In addition, noise measurements will be conducted during specified periods in order to determine possible turbine and generator noise levels.

6 Stakeholder's comments:

The Article 9 of the EIA Regulation stipulates a public participation process in order to provide participation of the communities in EIA process, to inform the communities about the proposed facility and to gather their opinions.

In order to satisfy this requirement, announcements were published in two newspapers (Zümrüt Riza and Dünya Gazetesi) –one national and one local- declaring the date, time, venue and topic of the meeting. (The mentioned announcements are presented in Annex 6)

The meeting was held on May 21st 2009 in the Kalkandere Religious High School in Rize Province The meeting which started at 14:00 under the chairmanship of the Rize Provincial Directorate of Environment and Forestry received a broad participation. (**Please refer to Figure 12**).

Figure 6: *Scenes from the Community Meeting.*

The participants comprised representatives from the community, relevant municipalities, public institutions and organizations, members of Parliament, scientists and inhabitants of the surrounding villages.

All the aspects of the project including the socio-economic and environmental aspects were presented to the participants by a project developer representative and were discussed by the stakeholders. Clarifications were requested and the overall response to the project was encouraging and positive. All the hearings were held in Turkish.

Stakeholders' comments in this meeting were intensified on 2 major subjects. The first one is how this project will provide economic advantage to the region. Project owners replied this question with the fact that the project will make employments from the region during both construction and operation phases. The other question topic was about how the project will affect the environment in the region. Project owners mentioned that there will be limited negative effect during the construction especially in dust emissions and noise issues. They also mentioned that these issues will be followed closely and regular measurements will be done. In addition to this, they have also underlined the fact that the water amount in the river bed will reduce within project boundries. However, there will always be enough amount of water in the river bed for the continuation of river life.

In addition to the community Meeting, the company will be open for further comments during the construction and operation of the project and the site manager will be the contact person for the stakeholders.

7 Schedule:

The project schedule is presented below:

Events and action	Date
First VER consideration	July 23rd 2004
First Feasibility report	October 2004
First contacts with PDD consultants	October 2007
Last Feasibility report	November 2007
EIA is not required decision	November 23rd 2007
Contact with a PDD consultant	April 25th 2008
Contact with a DOE	June 1st, 2008
First discussions with financial institutions	September 2008
Investment Decision	October 10th 2008
Contract signature for the construction works for Kalkandere	January 2nd 2009
Stakeholder consultation	June 20th 2009
EIA approval (by the Ministry of Environment and Forestry)	July 2009
Contract signature for the electromechanical and electrical works	May 7th 2009
Start of PDD elaboration	April 2010
Start of VER validation	June 2010
Construction Start of Kizilagac	January 2011
Commissioning of the Kalkandere power plant	December 30th, 2010
Expected commissioning of the Kizilagac power plant	March 2012
1st Monitoring and Reporting	May 2012
2nd Monitoring and Reporting	May 2013
3rd Monitoring and Reporting	May 2014
4thMonitoring and Reporting	May 2015
5th Monitoring and Reporting	May 2016
6th Monitoring and Reporting	May 2017
7th Monitoring and Reporting	May 2018
9th Monitoring and Reporting	May2019
10th Monitoring and Reporting	May 2020

Table 22: *Project's schedule*

8 Ownership:

8.1 Proof of Title:

The revised generation license is presented in ANNEX 8 as proof of title.
The ownership of the emission reductions will be Akim Enerji Üretimi Sanayi ve Ticaret A.Ş..

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

Not applicable.

ANNEX 1

"EIA is not required" and "Positive EIA" Proofs

Copy of the letter of the Trabzon Regional Forestry Directorate Forest Operation Management, dated March 27th 2006, number B.18.1.OGM.1.23.Ş3.231-2753.

This letter also states that the Project area is not located at a seeding area, national park, hunting and wildlife area, hunting production area, tourism area, special protection area, military forbidden zone; there is no disadvantageous condition regarding forestry works and forest-public relation; there is no sensitive area for the forest fires where the facilities will exist. Field investigation form is presented as the attachment of the letter.

Republic of Turkey
Ministry of Environment and Forestry
General Directorate of Environmental Impact Assessment and Planning

Decision Date : 06/11/2009
Decision Number : 1797

POSITIVE EIA LETTER

In accordance with the 14th article of the Regulation on Environmental Impact Assessment (Official Gazette, Date: 17.07.2008, Number: 26939), Environmental Impact Assessment of the project "Kalkandere Weir and HEPP (43,8 MW)" is positively concluded.

Fevzi İŞBİLİR
On behalf of the Minister
General Manager

Project Owner: Akim Enerji Üretimi Sanayi ve Ticaret A.Ş.

Project Location: Rize Province, Kalkandere District

T.C.
ÇEVRE ve ORMAN BAKANLIĞI
Çevresel Etki Değerlendirmesi ve Planlama Genel Müdürlüğü

Karar Tarihi: 06/11/2009
Karar No : 1797

ÇED OLUMLU BELGESİ

17.07.2008 tarih ve 26939 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği'nin 14. maddesi gereğince; "Kalkandere Regülatörü ve HES Yapıları (43,8 MW)" projesi hakkında *"Çevresel Etki Değerlendirmesi Olumlu"* kararı verilmiştir.

Fevzi İŞBİLİR
Bakan a.
Genel Müdür

Proje Sahibi : **AKIM Enerji Üretim Sanayi ve Ticaret A.Ş.**
Projenin Yeri : **Rize İli, Kalkandere İlçesi, Trabzon İli, Of İlçesi, İyidere Üzerinde**

ANNEX 2

Demonstration that the project has not created another form of environmental credit

AKIM

Subject: Declaration that the project has not created another form of environmental credits.

To: Voluntary Carbon Standard

Aware of the necessity of avoiding GHG double counting, Akım Enerji Üretimi Sanayi veTicaret A.Ş. declares that:

1- The GHG reductions generated by Kalkandere-Yokuşlu HEPP Project has not been included in any emission trading program other than the Voluntary Carbon Standard (VCS)

2- Kalkandere-Yokuşlu HEPP project does not take place in a jurisdication in which binding limits are established on GHG emissions, and therefore, the emission reductionswill not be used for the purpose of demonstrating compliance with binding limits at the project site.

Sincerely yours,

ZEKERIYE KONUKOGLU

SANKO

AKIM Enerji Üretimi Sanayi ve Ticaret A.Ş.
Burak Mahallesi Sani Konukoğlu Bulvarı No: 221 ŞEHİTKAMİL/GAZİANTEP
Tel: (0342) 211 37 00 Faks: (0342) 211 37 26

ANNEX 3

Hereafter the translation of the Board of Director' s decision Number 5, which states that the revenues obtained by selling the VERs has been one of the key issues encouraging the investment in the proposed project activity. The original will be provided to the DOE during the validation process.

AKIM ENERGY GENERATION INDUSTRY AND TRADE CO. BOARD OF DIRECTORS DECISION

DECISION NUMBER: 5
DATE OF DECISION: 23.7.2004
MEETING LOCATION: HEADQUARTERS OF COMPANY
PARTICIPANTS OF MEETING: Mehmet Faruk KOLUKISA
Osman ASILTURK
Alaaddin COSKUN

AGENDA OF MEETING: The objectives of our company and investments, feasibility of projects and about project applications.

DECISION: Our Company`s Board of Directors have met under the chairmanship of Mr. Mehmet Faruk KOLUKISA and took the decisions below.

Our country's energy need has been increasing day by day as the rest of the world. Most of the energy generation in our country depends on the fossil fuels which have lower investment costs, but significantly harm the environment during generation according to the fuel type and generation techniques. However, both reducing our country's dependence on energy from abroad and also making investments on energy that our country needs and for the purpose of showing environmental awareness, our current Renewable Energy resources have been investigated and despite all economic difficulties and long investment periods, and high initial investment costs, since it is understood if these environmentally friendly projects are supported by CER carbon credits and until CER carbon credits become available to be supported by additional incomes from VER credits;

As the result of our company's research and studies, since it is believed that if Cevizlik HEPP, Yokuslu Kalkandere HEPP, Ispir HEPP and Gullubag HEPP projects will become feasible if supported by additional incomes from carbon credits (CER and VER); it is decided unanimously to apply for obtaining generation licenses for Cevizlik HEPP, Yokuslu Kalkandere HEPP, Ispir HEPP and Gullubag HEPP projects.

Mehmet Faruk KOLUKISA	Osman ASILTURK	Alaaddin COSKUN
Chairman of Board of Dir.	Vice Chairman of Board of Dir.	Member of Board of Dir.

ANNEX 4

AKIM ENERGY GENERATION INDUSTRY AND TRADE CO. BOARD OF DIRECTORS DECISION

DECISION NUMBER: 7
DATE OF DECISION: 10.10.2008
MEETING LOCATION: HEADQUARTERS OF COMPANY
PARTICIPANTS OF MEETING: Dursun BAK
Alaaddin COSKUN
Osman ASILTURK

AGENDA OF MEETING: About energy investment projects' feasibility review and their applications which will be realised by our company,

DECISION: Our Company`s Board of Directors have met under the chairmanship of Mr. Dursun BAK and took the decisions below.

Our Board of Directors has taken the following decisions about Kalkandere Diversion Weir and Yokuşlu HEPP.

1) The Project has been changed significantly from its specified formulation in the feasibility report dated October 2004.
2) It can be seen from the November 2007 feasibility report which was submitted to State Hydraulic Works, the project's profitability is low however it's been decided to realise the project by getting additional support (carbon finance, bilateral electricity agreements etc.) from different revenues.

Dursun BAK	Alaaddin COSKUN	Osman ASİLTÜRK
Chairman of Board of Dir.	Vice Chairman of Board of Dir.	Member of Board of Dir.

ANNEX 5

Baseline Information

Electricity generation	2002	2003	2004	2005	2006	2007	2008
Gross Electricity Production	129.399,5	140.580,5	150.698,3	161.956,2	176.299,8	191.558,1	198.418,0
Net Electricity Production	123.726,8	135.248,3	145.065,7	155.469,1	169.543,1	183.339,7	189.761,9
Net/Gross	0,956	0,962	0,963	0,960	0,962	0,957	0,956
Net Electricity Production from Thermal Sources	**91.207,7**	**101.003,0**	**100.459,1**	**117.228,4**	**126.634,4**	**148.333,3**	**156.768,3**

Table 23: *Gross/Net Electricity Generation*

	kg CO2/GJ			Default Carbon Oxidation Factor
	Min	mid	max	
hard coal	92,8	96,1	100,0	1,0
lignite	90,9	101,0	115,0	1,0
fuel oil	75,5	77,4	78,8	1,0
diesel oil	72,6	74,1	74,8	1,0
natural gas	54,3	56,1	58,3	1,0
lpg	61,6	63,1	65,6	1,0
naphta	69,3	73,3	76,3	1,0

Source: *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction, Table 1.4*
http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Table 24: *IPCC Values*

	Fuel Consumption (FC i,y) [Ton]						
	2002	2003	2004	2005	2006	2007	2008
hard coal	2.050.700	3.705.686	4.564.713	5.259.058	5.617.863	6.029.143	6.270.008
lignite	42.576.239	35.556.028	33.776.660	48.319.143	50.583.810	61.223.821	66.374.120
fuel oil	3.180.701	2.864.392	2.403.338	2.005.899	1.746.370	2.250.686	2.173.371
diesel oil	98.374	14.123	29.141	28.442	61.501	50.233	131.206
natural gas	10.330.564	11.982.991	12.957.446	15.219.275	17.034.548	20.457.793	21.607.635
lpg	9.521	759	12.673	12.908	33	0	0
naphtha	219.122	264.371	208.749	84.481	13.453	11.441	10.606

Table 25: *Fuel Consumption*

	Net Calorific Value (NCVi,y) [GJ/t]						
	2002	2003	2004	2005	2006	2007	2008
hard coal	17,6	21,0	22,5	21,1	22,0	22,3	22,2
lignite	7,5	7,5	7,6	5,9	6,9	6,9	6,8
fuel oil	40,1	40,1	39,9	40,2	40,2	39,9	39,7
diesel oil	42,9	43,3	42,4	42,8	42,7	43,1	42,4
natural gas	40,8	39,1	38,0	38,6	37,0	36,7	36,6
lpg	46,2	44,1	45,9	46,1	0,0	0,0	0,0
naphtha	45,0	40,0	44,1	44,4	43,9	43,2	44,6

Table 26: *Net Calorific Values*

	2002	2003	2004	2005	2006	2007	2008
EFgrid,OM,y (tCO2/MWh)	0,721	0,657	0,672	0,638	0,657	0,663	0,664

EFGrid,OM (tCO2/MWh)	0,66149

Table 27: *Operating Margin Emission Factor*

Company	Facility	Index	Installed Capacity (MW)	Commissioning Date	Energy Prod. (MWh)*	CO2 EF (ton/TJ)	tCO2/MWh *	Facility Energy Efficiency	BM Emission Factor tCO2/MWh	CO2 (tons)
Mb Şeker Nişasta San. A.Ş. (Sultanhanı)	N.Gas	ANG	8,80	2008	60,0	54,3	0,20	60,0%	0,33	19,5
Aksa Enerji (Antalya)	N.Gas	ANG	183,80	2008	1.290,0	54,3	0,20	60,0%	0,33	419,9
Aksa Enerji (Manisa)	N.Gas	ANG	52,38	2008	370,0	54,3	0,20	60,0%	0,33	120,4
ANTALYA ENERJİ (Ilave)	N.GAS	ANG	17,46	2008	122,3	54,3	0,20	60,0%	0,33	39,8
Ataç Inşaat San. A.S.B. (Antalyta)	N.Gas	ANG	5,40	2008	37,0	54,3	0,20	60,0%	0,33	12,0
Bahçivan Gida (Lüleburgaz)	N.Gas	ANG	1,17	2008	8,0	54,3	0,20	60,0%	0,33	2,6
Can Enerji (Çorlu - Tekirdağ) (Ilave)	N.Gas	ANG	52,38	2008	304,2	54,3	0,20	60,0%	0,33	99,0
Four Seasons Otel (Atik Pasha Tur A.Ş.)	N.Gas	ANG	1,17	2008	7,0	54,3	0,20	60,0%	0,33	2,3
Fritolay Gida San. Ve Tic. A.Ş. (Ilave)	N.Gas	ANG	0,60	2008	4,0	54,3	0,20	60,0%	0,33	1,3
Itc-Ka Enerji Üretim A.Ş. (Mamak((Ilave)	Renew.+ Wastes	AR	14,13	2008	107,0	-	-	na	-	0,0
KARKEY (SİLOPİ-5) (154kv) (İlave)	F.OIL	AF	14,78	2008	103,2	75,5	0,27	46,0%	0,59	60,9
Melike Tekstil (Gaziantep)	N.Gas	ANG	1,58	2008	11,0	54,3	0,20	60,0%	0,33	3,6
Misis Apre Tekstil Boya En. San.	N.Gas	ANG	2,00	2008	14,0	54,3	0,20	60,0%	0,33	4,6
Modern Enerji (Lileburgaz)	N.Gas	ANG	13,40	2008	94,1	54,3	0,20	60,0%	0,33	30,6
Ortadoğu Enerji (Oda Yeri) (Eyip/Ist.)	Renew.+ Wastes	AR	2,83	2008	22,0	-	-	na	-	0,0
Polat Turz. (Polat Renaissance Ist.Ot.)	N.Gas	ANG	1,60	2008	11,0	54,3	0,20	60,0%	0,33	3,6
Sarayköy Jeotermal (Denizli)	Geothermal	AH	6,85	2008	50,0	-	-	na	-	0,0

Company	Facility	Index	Installed Capacity (MW)	Commissioning Date	Energy Prod. (MWh)*	CO2 EF (ton/TJ)	tCO2/MWh *	Facility Energy Efficiency	BM Emission Factor tCO2/MWh	CO2 (tons)
Yildiz Sunta (Uzunçiftlik-Köseköy)(Düzelt)	N.Gas	ANG	22,63	2008	146,5	54,3	0,20	60,0%	0,33	47,7
Sönmez Elektrik (Ilave)	N.Gas	ANG	8,73	2008	67,3	54,3	0,20	60,0%	0,33	21,9
Cansu Elektrik (Murgul/Artvin)	Hydro	AH	9,18	2008	47,0	-	-	na	-	0,0
Çeldere Elk. (Çaldere Hes)	Hydro	AH	8,74	2008	35,0	-	-	na	-	0,0
Daren Hes Elektrik	Hydro	AH	49,70	2008	182,0	-	-	na	-	0,0
Değirmenüstü En. (Kahramanmaraş)	Hydro	AH	25,70	2008	69,0	-	-	na	-	0,0
Gözede Hes (Temsa Elektrik) Bursa	Hydro	AH	2,40	2008	10,0	-	-	na	-	0,0
H.G.M. Enerji (Keklicek Hes)	Hydro	AH	8,67	2008	18,0	-	-	na	-	0,0
Hamzali Hes (Turkon Mng Elektrik)	Hydro	AH	16,70	2008	117,0	-	-	na	-	0,0
Hidro Knt. (Yukari Manahoz Reg. Ve Hes)	Hydro	AH	22,40	2008	79,0	-	-	na	-	0,0
İç-En Elk. (Çalkişla Reg. Ve Hes)	Hydro	AH	7,66	2008	18,0	-	-	na	-	0,0
Kalen Enerji (Kalen Ii Reg. Ve Hes)	Hydro	AH	15,65	2008	50,0	-	-	na	-	0,0
Maraş Enerji (Firnis Reg. Ve Hes)	Hydro	AH	7,22	2008	36,0	-	-	na	-	0,0
Sarmaşik I Hes (Fetaş Fethiye Enerji)	Hydro	AH	21,04	2008	96,0	-	-	na	-	0,0
Sarmaşik Ii Hes (Fetaş Fethiye Enerji)	Hydro	AH	21,58	2008	108,0	-	-	na	-	0,0
Torul	Hydro	EH	105,60	2008	322,0	-	-	na	-	0,0
Yeşil Enerji Elektrik (Tayfun Hes)	Hydro	AH	0,82	2008	5,0	-	-	na	-	0,0
Zorlu Enerji (Mercan)	Hydro	AH	1,28	2008	4,9	-	-	na	-	0,0
Baki Elektrik Şamli Rüzgar	Wind	AR	21,00	2008	104,0	-	-	na	-	0,0
Datça Res	Wind	AR	8,10	2008	24,0	-	-	na	-	0,0
Ertürk Elektrik Çatalca Res	Wind	AR	60,00	2008	210,0	-	-	na	-	0,0
Innores Elektrik Yuntdağ Rüzg. (Aliağa)	Wind	AR	42,50	2008	161,0	-	-	na	-	0,0
Lodos Res (Taşoluk)	Wind	AR	24,00	2008	85,0	-	-	na	-	0,0
Sayalar Rüzgar	Wind	AR	30,60	2008	97,0	-	-	na	-	0,0
Sebenoba (Deniz Elk.)	Wind	AR	31,20	2008	100,0	-	-	na	-	0,0
Habaş (Aliağa - Ilave)	N.Gas	ANG	9,10	2007	72,8	54,3	0,20	60,0%	0,33	23,7
Modern Enerji	N.Gas	ANG	5,20	2007	38,7	54,3	0,20	60,0%	0,33	12,6
Arenko	N.Gas	ANG	0,10	2007	0,8	54,3	0,20	60,0%	0,33	0,3
Altinmarka Gida	N.Gas	ANG	0,10	2007	0,8	54,3	0,20	60,0%	0,33	0,3
Tekboy Enerji	N.Gas	ANG	0,10	2007	0,7	54,3	0,20	60,0%	0,33	0,2
Velsan Akrilik	N.Gas	ANG	0,10	2007	0,6	54,3	0,20	60,0%	0,33	0,2
Acıbaden Sağlık Hiz. Ve Tic. A.Ş. / Kadıköy	N.Gas	ANG	0,50	2007	4,0	54,3	0,20	60,0%	0,33	1,3
Acıbaden Sağlık Hiz. Ve Tic. A.Ş. / Kozyatağı	N.Gas	ANG	0,60	2007	5,0	54,3	0,20	60,0%	0,33	1,6
Acıbaden Sağlık Hiz. Ve Tic. A.Ş. / Bursa	N.Gas	ANG	1,30	2007	11,0	54,3	0,20	60,0%	0,33	3,6

Company	Facility	Index	Installed Capacity (MW)	Commissioning Date	Energy Prod. (MWh)*	CO2 EF (ton/TJ)	tCO2/MWh *	Facility Energy Efficiency	BM Emission Factor tCO2/MWh	CO2 (tons)
Akateks	N.Gas	ANG	1,80	2007	14,0	54,3	0,20	60,0%	0,33	4,6
Flokser Tekstil / Poliser Tesisi	N.Gas	ANG	2,10	2007	17,0	54,3	0,20	60,0%	0,33	5,5
Flokser Tekstil / Süetser Tesisi	N.Gas	ANG	2,10	2007	17,0	54,3	0,20	60,0%	0,33	5,5
Fritolay Gida	N.Gas	ANG	0,50	2007	4,0	54,3	0,20	60,0%	0,33	1,3
Kivanç Tekstil	N.Gas	ANG	3,90	2007	33,0	54,3	0,20	60,0%	0,33	10,7
Kil-Kan Kil San. Ve Tic	N.Gas	ANG	3,20	2007	25,0	54,3	0,20	60,0%	0,33	8,1
Süperboy Boya San.	N.Gas	ANG	1,00	2007	8,0	54,3	0,20	60,0%	0,33	2,6
Swiss Otel	N.Gas	ANG	1,60	2007	11,0	54,3	0,20	60,0%	0,33	3,6
Tav Esenboğa	N.Gas	ANG	3,90	2007	33,0	54,3	0,20	60,0%	0,33	10,7
Nuh Enerji-2	N.Gas	ANG	73,00	2007	514,0	54,3	0,20	60,0%	0,33	167,3
Akteks	F.Oil	AF	0,80	2007	5,4	75,5	0,27	46,0%	0,59	3,2
Uşak Şeker	Lignite	AL	1,70	2007	10,3	90,9	0,33	39,0%	0,84	8,6
Boğazliyan Şeker	N.Gas+Naphtha	ANG	16,40	2007	102,6	54,3	0,20	60,0%	0,33	33,4
Kartonsan	N.Gas+Naphtha	ANG	5,00	2007	40,0	54,3	0,20	60,0%	0,33	13,0
Eskişehir End. Enerji	N.Gas+Naphtha	ANG	3,50	2007	26,8	54,3	0,20	60,0%	0,33	8,7
Eskişehir Şeker	N.Gas+Naphtha	ANG	2,90	2007	18,1	54,3	0,20	60,0%	0,33	5,9
İgsaş	N.Gas+Naphtha	ANG	2,20	2007	15,2	54,3	0,20	60,0%	0,33	4,9
Desa	N.Gas+Naphtha	ANG	0,70	2007	5,6	54,3	0,20	60,0%	0,33	1,8
Dentaş	N.Gas+Naphtha	ANG	0,30	2007	2,3	54,3	0,20	60,0%	0,33	0,7
Süper Filmcilik	N.Gas+Naphtha	ANG	0,10	2007	0,8	54,3	0,20	60,0%	0,33	0,3
Ataer Enerji	N.Gas+Naphtha	ANG	0,10	2007	0,6	54,3	0,20	60,0%	0,33	0,2
Bil Enerji	N.Gas+Naphtha	ANG	0,10	2007	0,7	54,3	0,20	60,0%	0,33	0,2
Itc-Ka	Renew.+ Wastes	AR	1,40	2007	11,1	-	-	na	-	0,0
BIS ENERJİ Bursa Ilave	N.GAS	ANG	43,00	2007	354,8	54,3	0,20	60,0%	0,33	115,5
Aliağa Çakmaktepe	N.Gas	ANG	34,80	2007	278,0	54,3	0,20	60,0%	0,33	90,5
Bis Enerji Bursa Düzeltilme	N.Gas	ANG	28,30	2007	233,5	54,3	0,20	60,0%	0,33	76,0
BIS ENERJİ Bursa Ilave	N.GAS	ANG	48,00	2007	396,1	54,3	0,20	60,0%	0,33	128,9
Bosen Enerji	N.Gas	ANG	142,80	2007	1.071,0	54,3	0,20	60,0%	0,33	348,7
Sayenerji Elektrik	N.Gas	ANG	5,90	2007	47,0	54,3	0,20	60,0%	0,33	15,3
T Enerji Üretim A.Ş.	N.Gas	ANG	1,60	2007	13,0	54,3	0,20	60,0%	0,33	4,2
Zorlu Enerji Kayseri	N.Gas	ANG	7,20	2007	55,0	54,3	0,20	60,0%	0,33	17,9
Siirt	F.Oil	AF	25,60	2007	190,0	75,5	0,27	46,0%	0,59	112,2
Mardin Kiziltepe	F.Oil	AF	34,10	2007	250,0	75,5	0,27	46,0%	0,59	147,6
Karen	F.Oil	AF	24,30	2007	180,0	75,5	0,27	46,0%	0,59	106,3
İdil 2 (Ps3 A-2)	F.Oil	AF	24,40	2007	180,0	75,5	0,27	46,0%		106,3

									0,59	
Borçka Hes	Hydro	EH	300,60	2007	1.039,0	-	-	na	-	0,0
Tektuğ (Keban Deresi)	Hydro	AH	5,00	2007	32,0	-	-	na	-	0,0
Ypm Ener. Yat. A.Ş. Altıntepe Hidro	Hydro	AH	4,00	2007	18,0	-	-	na	-	0,0
Ypm Ener. Yat. A.Ş. Beypınar Hidro	Hydro	AH	3,60	2007	18,0	-	-	na	-	0,0
Ypm Ener. Yat. A.Ş. Konak Hidro	Hydro	AH	4,00	2007	19,0	-	-	na	-	0,0
Kurteks Tekstil (Karasu Hes - Andırın)	Hydro	AH	2,40	2007	19,0	-	-	na	-	0,0
Iskur Tekstil (Suleymanli Hes)	Hydro	AH	4,60	2007	18,0	-	-	na	-	0,0
Özgür Elk. Aş. (K.Maraş) (Tahta)	Hydro	AH	6,30	2007	27,0	-	-	na	-	0,0
Özgür Elk. Aş. (K.Maraş) (Tahta) Ilave	Hydro	AH	6,30	2007	27,0	-	-	na	-	0,0
Anemon En: Elek. Üretim A.Ş.	Wind	AR	8,00	2007	24,2	-	-	na	-	0,0
Company	**Facility**	**Index**	**Installed Capacity (MW)**	**Commissioning Date**	**Energy Prod. (MWh)***	**CO2 EF (ton/ TJ)**	**tCO2/ MWh ***	**Facility Energy Efficiency**	**BM Emission Factor tCO2/ MWh**	**CO2 (tons)**
Anemon En: Elek. Üretim A.Ş. Ilave	Wind	AR	15,20	2007	46,0	-	-	na	-	0,0
Anemon En: Elek. Üretim A.Ş. Ilave	Wind	AR	7,20	2007	21,8	-	-	na	-	0,0
Burgaz Res (Doğal Enerji Üretim A.Ş.)	Wind	AR	4,00	2007	12,9	-	-	na	-	0,0
Burgaz Res (Doğal Enerji Üretim A.Ş.)	Wind	AR	10,90	2007	35,1	-	-	na	-	0,0
Deniz Elek. Üretim Ltd. Şti. (Karakurt)	Wind	AR	10,80	2007	28,0	-	-	na	-	0,0
Mare Mmanastir Rüzgar Enerji	Wind	AR	11,2	2007	36,9	-	-	na	-	0,0
Mare Mmanastir Rüzgar Enerji	Wind	AR	20,00	2007	65,8	-	-	na	-	0,0
Ekoten Tekstil Gr-I	N.Gas	ANG	1,93	16.02.2006	14,0	54,3	0,20	60,0%	0,33	4,6
Erak Giyim Gr-I	N.Gas	ANG	1,37	22.02.2006	10,0	54,3	0,20	60,0%	0,33	3,3
Alarko Altek Gr-Iii	N.Gas	ANG	21,89	23.02.2006	158,3	54,3	0,20	60,0%	0,33	51,5
Aydin Örme Gr-I	N.Gas	ANG	7,52	25.02.2006	60,0	54,3	0,20	60,0%	0,33	19,5
Nuh Enerji-2 Gr Ii	N.Gas	ANG	26,08	02.03.2006	180,1	54,3	0,20	60,0%	0,33	58,6
MARMARA ELEKTRİK (Çorlu) GR-I	N.GAS	ANG	8,73	13.04.2006	63,0	54,3	0,20	60,0%	0,33	20,5
Marmara Pamuk (Çorlu) Gr-I	N.Gas	ANG	8,73	13.04.2006	63,0	54,3	0,20	60,0%	0,33	20,5
Entek (Köseköy) Gr Iv	N.Gas	ANG	47,62	14.04.2006	391,3	54,3	0,20	60,0%	0,33	127,4
Else Tekstil (Çorlu) Gr I-Ii	N.Gas	ANG	3,16	15.04.2006	25,0	54,3	0,20	60,0%	0,33	8,1
Bares Ix Grup	Wind	AR	13,50	20.04.2006	47,3	-	-	na	-	0,0
Sönmez Elektrik (Çorlu) Gr I - Ii	N.Gas	ANG	17,46	03.05.2006	126,0	54,3	0,20	60,0%	0,33	41,0
Denizli Çimento (Düzeltme)	N.Gas	ANG	0,45	04.05.2006	3,2	54,3	0,20	60,0%	0,33	1,0
Menderes Elektrik Gr I	Geothermal	AH	7,95	10.05.2006	56,0	-	-	na	-	0,0
Kastamonu Entegre Baliksir Gr-I	N.Gas	ANG	7,52	24.05.2006	54,0	54,3	0,20	60,0%	0,33	17,6
Bares X. Ve Xx. Gruplar	Wind	AR	16,50	26.05.2006	57,8	-	-	na	-	0,0
Boz Enerji Gr-I	N.Gas	ANG	8,73	09.06.2006	70,0	54,3	0,20	60,0%	0,33	22,8

Adana Atik Su Aritma Tesisi	Renew.+ Wastes	AR	0,80	09.06.2006	6,0	-	-	na	-	0,0
Amylum Nişasta (Adana)	N.Gas	ANG	14,25	09.06.2006	34,0	54,3	0,20	60,0%	0,33	11,1
Şik Makas (Çorlu) Gr-I	N.Gas	ANG	1,58	22.06.2006	13,0	54,3	0,20	60,0%	0,33	4,2
Elbistan B Gr-Iii	Lignite	EL	360,00	23.06.2006	2.340,0	90,9	0,33	39,0%	0,84	1.961,9
Antalya Enerji Gr I - Ii - Iii - Iv	N.Gas	ANG	34,92	29.06.2006	245,0	54,3	0,20	60,0%	0,33	79,8
Hayat Tem. Ve Sağlik Gr I - Ii	N.Gas	ANG	15,04	30.06.2006	108,0	54,3	0,20	60,0%	0,33	35,2
Ekolojik En. (Kemerburgaz) Gr I	Renew.+ Wastes	AR	0,98	31.07.2006	6,0	-	-	na	-	0,0
Eroğlu Giyim (Çorlu) Gr-I	N.Gas	ANG	1,17	01.08.2006	9,0	54,3	0,20	60,0%	0,33	2,9
Cam Iş Elektrik (Mersin) Gr I	N.Gas	ANG	126,10	13.09.2006	1.008,0	54,3	0,20	60,0%	0,33	328,1
Elbistan B Gr Ii	Lignite	EL	360,00	17.09.2006	2.340,0	90,9	0,33	39,0%	0,84	1.961,9
Yildiz Ent. Ağaç (Kocaeli) Gr I	N.Gas	ANG	6,18	21.09.2006	40,0	54,3	0,20	60,0%	0,33	13,0
Çerkezköy Enerji Gr I	N.Gas	ANG	49,16	06.10.2006	390,0	54,3	0,20	60,0%	0,33	127,0
Entek (Köseköy) Gr V	N.Gas	ANG	37,00	03.11.2006	304,0	54,3	0,20	60,0%	0,33	99,0
Itc-Ka En. Mamak Top.M. Gr I-Ii-Iii	Renew.+ Wastes	AR	4,24	03.11.2006	30,0	-	-	na	-	0,0
Elbistan B Grup Iv	Lignite	EL	360,00	13.11.2006	2.340,0	90,9	0,33	39,0%	0,84	1.961,9
Mare Manastir Rüzgar (X Grup)	Wind	AR	8,00	08.12.2006	25,0	-	-	na	-	0,0
Company	**Facility**	**Index**	**Installed Capacity (MW)**	**Commissioning Date**	**Energy Prod. (MWh)***	**CO2 EF (ton/ TJ)**	**tCO2/ MWh ***	**Facility Energy Efficiency**	**BM Emission Factor tCO2/ MWh**	**CO2 (tons)**
Çirağan Sarayi Gr I	N.Gas	ANG	1,32	01.12.2006	11,0	54,3	0,20	60,0%	0,33	3,6
Ertürk Elektrik Tepe Res Gr I	Wind	AR	0,85	22.12.2006	2,0	-	-	na	-	0,0
Akmaya (Lüleburgaz) Gr I	N.Gas	ANG	6,91	23.12.2006	50,0	54,3	0,20	60,0%	0,33	16,3
Burgaz (Lüleburgaz) Gr I	N.Gas	ANG	6,91	23.12.2006	54,0	54,3	0,20	60,0%	0,33	17,6
Seyhan I-Ii	Hydro	EH	0,30	20.02.2006	1,7	-	-	na	-	0,0
Şanliurfa Gr I-Ii	Hydro	EH	51,80	01.03.2006	124,0	-	-	na	-	0,0
Bereket Enerji Gökyar Hes 3 Grup	Hydro	AH	11,62	05.05.2006	43,3	-	-	na	-	0,0
Molu En. Zamantı Bahçelik Gr I - Ii	Hydro	AH	4,22	31.05.2006	16,7	-	-	na	-	0,0
Su Enerji Balikesir Gr I - Ii	Hydro	AH	4,60	27.06.2006	20,7	-	-	na	-	0,0
Bereket En. Mentaş Reg. Gr I - Ii	Hydro	AH	26,60	31.07.2006	108,7	-	-	na	-	0,0
Ekin (Başaran Hes) (Nazilli)	Hydro	AH	0,60	11.08.2006	4,5	-	-	na	-	0,0
Ere (Sugözü Reg. Ve Kızıldüz Hes)	Hydro	AH	15,43	08.09.2006	31,6	-	-	na	-	0,0
Ere (Aksu Reg. Ve Şahmallar Hes)	Hydro	AH	14,00	16.11.2006	26,7	-	-	na	-	0,0
Tektuğ (Kalealti) Gr I - Ii	Hydro	AH	15,00	30.11.2006	52,0	-	-	na	-	0,0
Bereket En. Mentaş Reg. Gr Iii	Hydro	AH	13,30	13.12.2006	54,4	-	-	na	-	0,0
Bosen Gr-Iii	N.Gas	ANG	51,02	30.12.2005	372,8	54,3	0,20	60,0%	0,33	121,4
Karkey (Silopi-4) Gr-V	F.Oil	AF	6,75	23.12.2005	51,9	75,5	0,27	46,0%	0,59	30,6
Akça Enerji Gr-Iii	N.Gas+Naphtha	ANG	8,73	14.12.2005	65,5	54,3	0,20	60,0%	0,33	21,3
Kahramanmaraş Kağit	Importe	AHC	6,00	08.12.2005	45,0	92,8	0,33	39,0%		38,5

Gr-I	d Coal								0,86	
Pak Gida	N.Gas	ANG	5,67	07.12.2005	45,0	54,3	0,20	60,0%	0,33	14,6
Koruma Klor Gr I-Ii-Iii	N.Gas	ANG	9,60	03.12.2005	77,0	54,3	0,20	60,0%	0,33	25,1
İçdaş Çelik Gr-I	Importe d Coal	AHC	135,00	30.11.2005	1.080,0	92,8	0,33	39,0%	0,86	924,4
Küçükçalik Tekstil Gr I-Ii-Iii-Iv	N.Gas	ANG	8,00	27.11.2005	64,0	54,3	0,20	60,0%	0,33	20,8
Zorlu Enerji Yalova Gr I-Ii	N.Gas	ANG	15,93	26.11.2005	122,0	54,3	0,20	60,0%	0,33	39,7
Habaş Aliağa Gr-V	N.Gas	ANG	23,00	24.11.2005	184,0	54,3	0,20	60,0%	0,33	59,9
Graniser Granit Gr-I	N.Gas	ANG	5,50	14.11.2005	42,0	54,3	0,20	60,0%	0,33	13,7
Mosb Gr I-Ii-Iii-Iv-V-Vi-Vii	N.Gas	ANG	84,83	11.11.2005	434,0	54,3	0,20	60,0%	0,33	141,3
AK ENERJİ(K.Paşa) GR-III	N.GAS	ANG	40,00	09.11.2005	256,9	54,3	0,20	60,0%	0,33	83,6
Zorlu Enerji Kayseri Gr-Iv	N.Gas	ANG	38,63	26.10.2005	294,9	54,3	0,20	60,0%	0,33	96,0
Altek Alarko Gr I-Ii	N.Gas	ANG	60,10	14.10.2005	420,0	54,3	0,20	60,0%	0,33	136,7
Ayka Tekstil Gr-I	N.Gas	ANG	5,50	24.09.2005	40,0	54,3	0,20	60,0%	0,33	13,0
Habaş Aliağa Gr Iv	N.Gas	ANG	44,62	21.09.2005	357,0	54,3	0,20	60,0%	0,33	116,2
Evyap Gr I-Ii	N.Gas	ANG	5,12	27.08.2005	30,0	54,3	0,20	60,0%	0,33	9,8
Çebi Enerji Bt	N.Gas	ANG	21,00	27.08.2005	164,7	54,3	0,20	60,0%	0,33	53,6
Can Enerji Gr-I	N.Gas	ANG	3,90	25.08.2005	28,0	54,3	0,20	60,0%	0,33	9,1
Noren Enerji Gr-I	N.Gas	ANG	8,73	24.08.2005	70,0	54,3	0,20	60,0%	0,33	22,8
Çebi Enerji Gt	N.Gas	ANG	43,37	23.08.2005	340,1	54,3	0,20	60,0%	0,33	110,7
Yamula Grup I-Ii	Hydro	EH	100,00	31.07.2005	422,0	-	-	na	-	0,0
Zorlu Enerji Kayseri Gr-I-Ii-Iii	N.Gas	ANG	149,87	22.07.2005	1.144,1	54,3	0,20	60,0%	0,33	372,5
Bereket En. (Dalaman) Gr Xiii-Xiv-Xv	Hydro	AH	7,50	15.07.2005	35,8	-	-	na	-	0,0
Company	**Facility**	**Index**	**Installed Capacity (MW)**	**Commissioning Date**	**Energy Prod. (MWh)***	**CO2 EF (ton/ TJ)**	**tCO2/ MWh ***	**Facility Energy Efficiency**	**BM Emission Factor tCO2/ MWh**	**CO2 (tons)**
Eti Mad.(Ban.Asit)Gr-I	Renew.+ Wastes	AR	11,50	15.07.2005	88,0	-	-	na	-	0,0
Zeynep Giyim San. Gr-I	N.Gas	ANG	1,17	07.07.2005	9,0	54,3	0,20	60,0%	0,33	2,9
Karkey (Silopi-4) Gr-Iv	F.Oil	AF	6,15	30.06.2005	47,2	75,5	0,27	46,0%	0,59	27,9
Akbaşlar Gr-Ii(Izole)	N.Gas	ANG	9,00	24.06.2005	71,3	54,3	0,20	60,0%	0,33	23,2
Modern Enerji (Dg) Gr-Iii	N.Gas	ANG	8,38	14.06.2005	61,1	54,3	0,20	60,0%	0,33	19,9
Modern Enerji (Dg+Lpg) Gr-Ii	N.Gas+Lpg	ANG	7,68	13.06.2005	56,0	54,3	0,20	60,0%	0,33	18,2
Modern Enerji (Dg+Lpg) Gr-Ii (Düzeltme)	N.Gas+Lpg	ANG	4,50	13.06.2005	32,8	54,3	0,20	60,0%	0,33	10,7
Muratli Gr I-Ii	Hydro	EH	115,00	03.06.2005	444,0	-	-	na	-	0,0
Habaş Aliağa Gr Iii	N.Gas	ANG	44,62	02.06.2005	356,9	54,3	0,20	60,0%	0,33	116,2
Hayat Kağit Gr-I	N.Gas	ANG	7,53	27.05.2005	56,0	54,3	0,20	60,0%	0,33	18,2
Tezcan Galvaniz Gr I-Ii	N.Gas	ANG	3,66	27.05.2005	29,0	54,3	0,20	60,0%	0,33	9,4
Yongapan(Kast.Entg) Gr-Ii	N.Gas	ANG	5,20	25.05.2005	35,8	54,3	0,20	60,0%	0,33	11,7

Nuh Enerji-2 Gr I	N.Gas	ANG	46,95	24.05.2005	319,7	54,3	0,20	60,0%	0,33	104,1
İçtaş Enerji (Yukarı Mercan) Gr I-Ii	Hydro	AH	14,19	22.05.2005	44,0	-	-	na	-	0,0
AK ENERJİ(K.Paşa) GR I-II	N.GAS	ANG	87,20	30.04.2005	560,1	54,3	0,20	60,0%	0,33	182,3
Tektuğ (Kargılık) Gr I-Ii	Hydro	AH	23,90	25.04.2005	83,0	-	-	na	-	0,0
Sunjüt(Res) Gr I-Ii	Wind	AR	1,20	23.04.2005	2,0	-	-	na	-	0,0
Karege Gr Iv-V	N.Gas	ANG	18,06	07.04.2005	141,9	54,3	0,20	60,0%	0,33	46,2
Bis Enerji Gr Vii	N.Gas	ANG	43,70	18.03.2005	287,6	54,3	0,20	60,0%	0,33	93,6
Çan Gr I (Eüaş)	Lignite	EL	160,00	15.03.2005	1.040,0	90,9	0,33	39,0%	0,84	871,9
Çan Gr I (Eüaş)	Lignite	EL	160,00	15.02.2005	1.040,0	90,9	0,33	39,0%	0,84	871,9
Elbistan-B Gr I (Eüaş)	Lignite	EL	360,00	15.02.2005	2.340,0	90,9	0,33	39,0%	0,84	1.961,9
Entek Elk.A.Ş.Koç Üni.Gr I-Ii	N.Gas	ANG	2,33	07.02.2005	19,0	54,3	0,20	60,0%	0,33	6,2
Baydemirler Gr Iv-V-Vi	N.Gas	ANG	6,21	04.02.2005	49,3	54,3	0,20	60,0%	0,33	16,1
Mercedes Benz Turk Gr I-Ii-Iii-Iv	N.Gas	ANG	8,28	04.02.2005	68,0	54,3	0,20	60,0%	0,33	22,1
Metem Enerji (Hacışıramat) Gr I-Ii	N.Gas	ANG	7,83	29.01.2005	58,0	54,3	0,20	60,0%	0,33	18,9
Metem Enerji (Peliklik) Gr I-Ii-Iii	N.Gas	ANG	11,75	29.01.2005	89,0	54,3	0,20	60,0%	0,33	29,0
Altinmarka Gida Gr I-Ii-Iii	N.Gas	ANG	3,60	17.12.2004	28,8	54,3	0,20	60,0%	0,33	9,4
Karkey-Ii 3+3 Dgm	Fuel-Oil	AF	54,30	12.11.2004	370,0	75,5	0,27	46,0%	0,59	218,4
Standart Profil 3 Gm	N.Gas	ANG	6,74	22.10.2004	49,2	54,3	0,20	60,0%	0,33	16,0
Habaş Aliağa Grup I-Ii	N.Gas	ANG	89,23	08.10.2004	713,7	54,3	0,20	60,0%	0,33	232,3
Ayen Ostim Enerji Üretim(Bt)	N.Gas	ANG	9,89	01.10.2004	84,0	54,3	0,20	60,0%	0,33	27,4
Kombassan Kağ. Matbaa Gida	N.Gas	ANG	5,50	24.09.2004	35,7	54,3	0,20	60,0%	0,33	11,6
Bereket En.(Feslek Hes) Gr-1-2	Hydro	AH	9,48	05.08.2004	41,0	-	-	na	-	0,0
Çelik Enerji Ür.Şti. 2 Gm	N.Gas	ANG	2,42	09.07.2004	19,0	54,3	0,20	60,0%	0,33	6,2
Besler Gr-2, Bt (5,2+7,5)	N.Gas	ANG	12,70	07.07.2004	95,3	54,3	0,20	60,0%	0,33	31,0
Şahinler Enerji 1 Gm	N.Gas	ANG	3,20	29.06.2004	24,9	54,3	0,20	60,0%	0,33	8,1
Enerji-Sa Adana 1 Bt	Naphta	AN	49,77	23.06.2004	373,3	69,3	0,25	60,0%	0,42	155,1
Bis Enerji 2 Gt	N.Gas	ANG	73,04	16.06.2004	602,6	54,3	0,20	60,0%	0,33	196,2
Ayen Ostim Enerji Üretim	N.Gas	ANG	31,08	11.06.2004	264,1	54,3	0,20	60,0%	0,33	86,0
Company	**Facility**	**Index**	**Installed Capacity (MW)**	**Commissioning Date**	**Energy Prod. (MWh)***	**CO2 EF (ton/ TJ)**	**tCO2/ MWh ***	**Facility Energy Efficiency**	**BM Emission Factor tCO2/ MWh**	**CO2 (tons)**
Kombassan Kağit Gida Ve Teks	N.Gas	ANG	5,50	09.06.2004	38,1	54,3	0,20	60,0%	0,33	12,4
Gül Enerji Gr-Ii	Fuel-Oil	AF	12,50	03.06.2004	93,8	75,5	0,27	46,0%	0,59	55,4
Tekboy Tekstil 1 Gm	N.Gas	ANG	2,25	18.05.2004	16,0	54,3	0,20	60,0%	0,33	5,2
Çolakoğlu(Kapasite Artirimi)	Imported Coal	AHC	45,00	05.05.2004	347,8	92,8	0,33	39,0%	0,86	297,7
İskur Tekstil(Süleymanli) Gr I-Ii	Hydro	AR	4,60	28.04.2004	17,9	-	-	na	-	0,0
Elta Elk(Dodurga) Gr-I-Ii-Iii-Iv	Hydro	AR	4,14	26.04.2004	12,3	-	-	na	-	0,0

Tanriverdi 4 Gm	N.Gas	ANG	4,66	24.03.2004	38,7	54,3	0,20	60,0%	0,33	12,6
Ere(Bir Kapili Hes) Grup-I	Hydro	AR	48,50	11.03.2004	170,5	-	-	na	-	0,0
Atateks 2 Gm	N.Gas	ANG	5,63	20.02.2004	45,0	54,3	0,20	60,0%	0,33	14,6
Entek Gr-Iv	N.Gas + Naphta	ANG	31,13	12.02.2004	233,5	54,3	0,20	60,0%	0,33	76,0
Ankara D.G.(Baymina) Gr-I-Ii-Iii	N.Gas	ANG	798,00	08.01.2004	6.500,0	54,3	0,20	60,0%	0,33	2.116,0
TOTAL					**45.670,2**					**20.069,5**

Table 28: *Most Recently Comissioned Power Plants (2004 - 2008)*

	Total Electricity Generation (GWh)	Net Electricity Generation (GWh)	Total CO2 Emissions (Ton)	BM Values for each year (tCO2/MWh)
2008	4.835,6	4.624,6	889,9	0,192
2007	5.785,8	5.537,6	1.614,2	0,291
2006	11.218,1	10.788,2	7.019,7	0,651
2005	13.615,5	13.070,1	6.958,0	0,532
2004	10.215,2	9.833,4	3.587,7	0,365

BM Emission Factor :	**0,45764**

Table 29: *Built Margin Emission Factor*

Parameter	SI Unit	Result
EFGrid,OM,y	tCO2/MWh	0,661489
EFGrid,BM,y	tCO2/MWh	0,457644
EFGrid,CM,y	tCO2/MWh	0,559566

Table 30: *Summary of Grid Emission Factor Calculation*

ANNEX 6

Newspaper Invitations to the Stakeholder Meeting

DUYURU

HALKIMIZA DUYURULUR.
AKIM ENERJİ ÜRETİMİ SANAYİ VE TİCARET A.Ş.

a. Zümrüt Rize Gazetesi(08.05.2009)

DUYURU

Rize İli, Kalkandere İlçesi sınırları içerisinde, İyidere üzerinde;

Akım Enerji Üretimi Sanayi ve Ticaret A.Ş. tarafından,

"Kalkandere Projesi"nin yapılması planlanmaktadır.

Söz konusu faaliyet ile ilgili olarak, 17.07.2008 tarih ve 26939 sayılı Resmi Gazeta'da yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi (ÇED) Yönetmeliği gereğince, aşağıda belirtilen yer, gün ve saatte "ÇED Sürecine Halkın Katılımı Toplantısı" düzenlenecektir.

Yer : Kalkandere İmam Hatip Lisesi Salonu
Adres : Merkez Çaykur Fabrikası Arkası Kalkandere / RİZE
Tarih : 21.05.2009
Saat : 14:00

İlgili yönetmeliğin 9. Maddesi gereğince

HALKIMIZA DUYURULUR.
AKIM ENERJİ ÜRETİMİ SANAYİ VE TİCARET A.Ş.

b. Vatan Gazetesi (08.05.2009)

Figure 7: *Newspaper Announcements for the Community Meeting*

ANNEX 7

Photographs of the Flood Disaster Affected The Facility Neighbouring The Project

Figure 8*: Flood disaster*

Figure 9*: Flood disaster*

Figure 10: *Flood Disaster*

ANNEX 8

The document below explains that this license is provided to Akim Ênerji Uretim Sanayi ve Ticaret A.S. for Yokuslu Kalkandere project which is planned to be installed in Rize province, in accordance with Energy Market Law and the Decision of Energy Market Regulatory Authority (Date: 14.09.2006, Number: 915-2) for 49 years.

T.C.
ENERJİ PİYASASI DÜZENLEME KURUMU

EPDK

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi Yenilenebilir Enerji Kaynağı Kullanmaktadır.

Lisans No : EÜ/915-2/719

Tarih : 14/09/2006

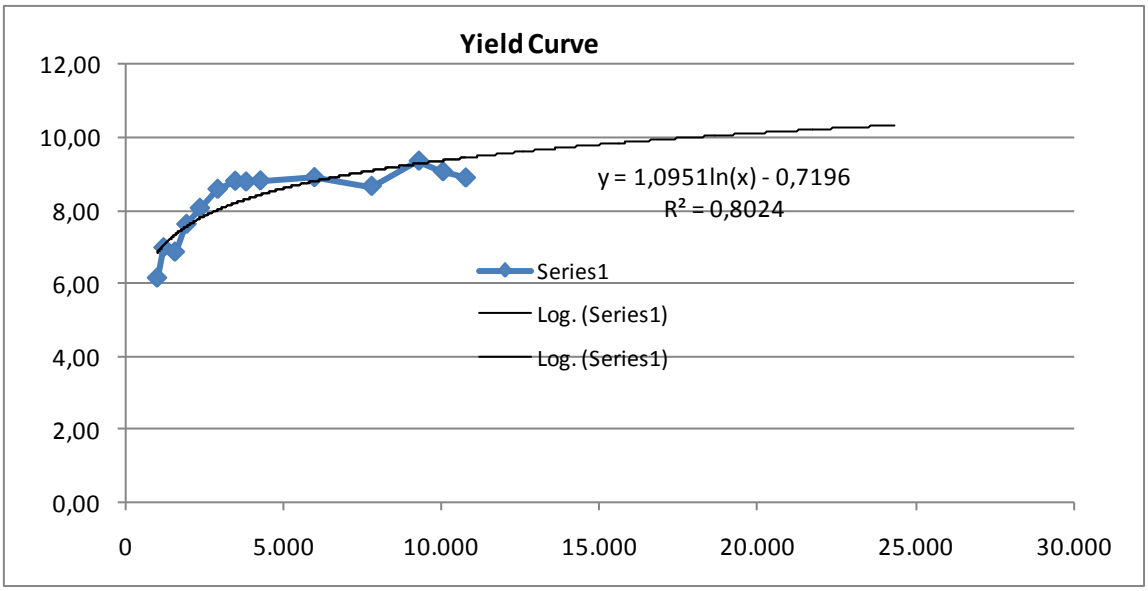
Bu Lisans, **Akım Enerji Üretimi Sanayi ve Ticaret Anonim Şirketi**'ne, Rize İli'nde kurulacak olan **Yokuşlu Kalkandere Hidroelektrik Santralı** üretim tesisinde 14/09/2006 tarihinden itibaren 49 yıl süreyle, üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 14/09/2006 tarihli ve 915-2 sayılı Kararı ile verilmiştir.

Yusuf GÜNAY
Başkan

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

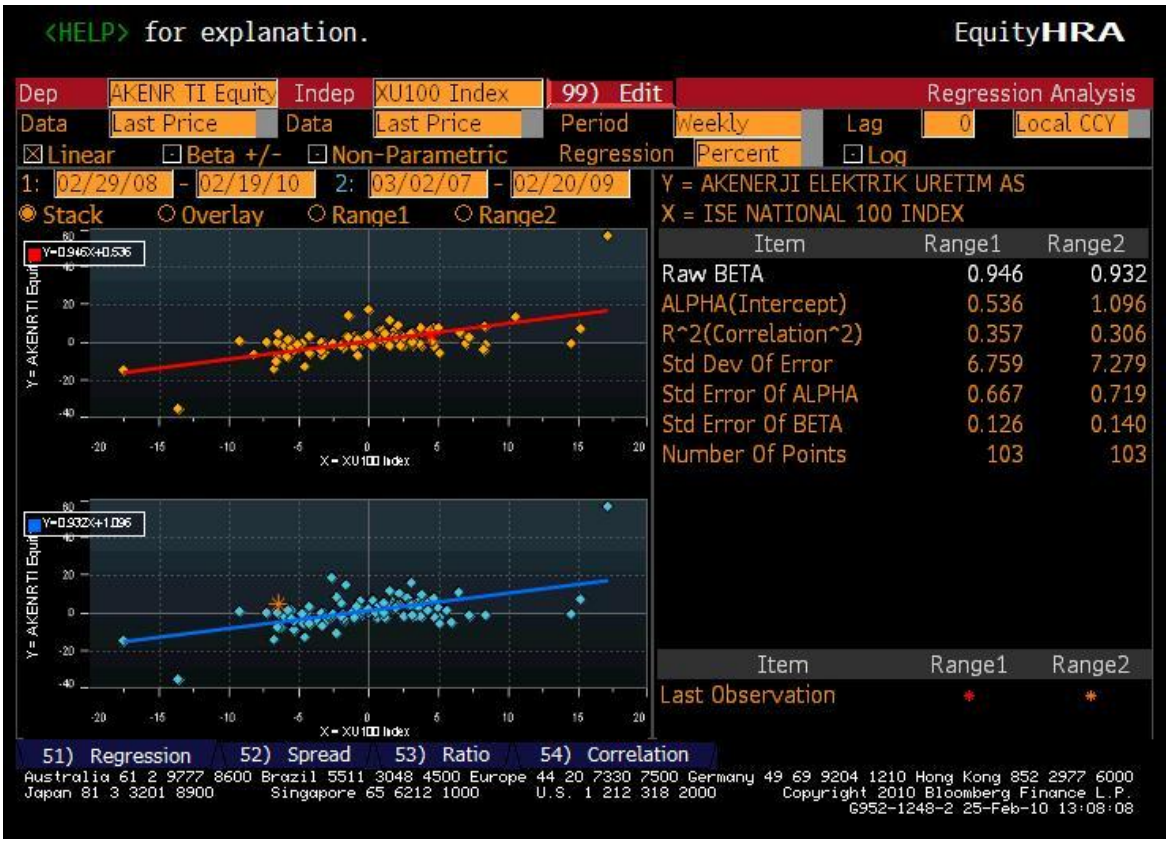
ANNEX 9

Yield curve



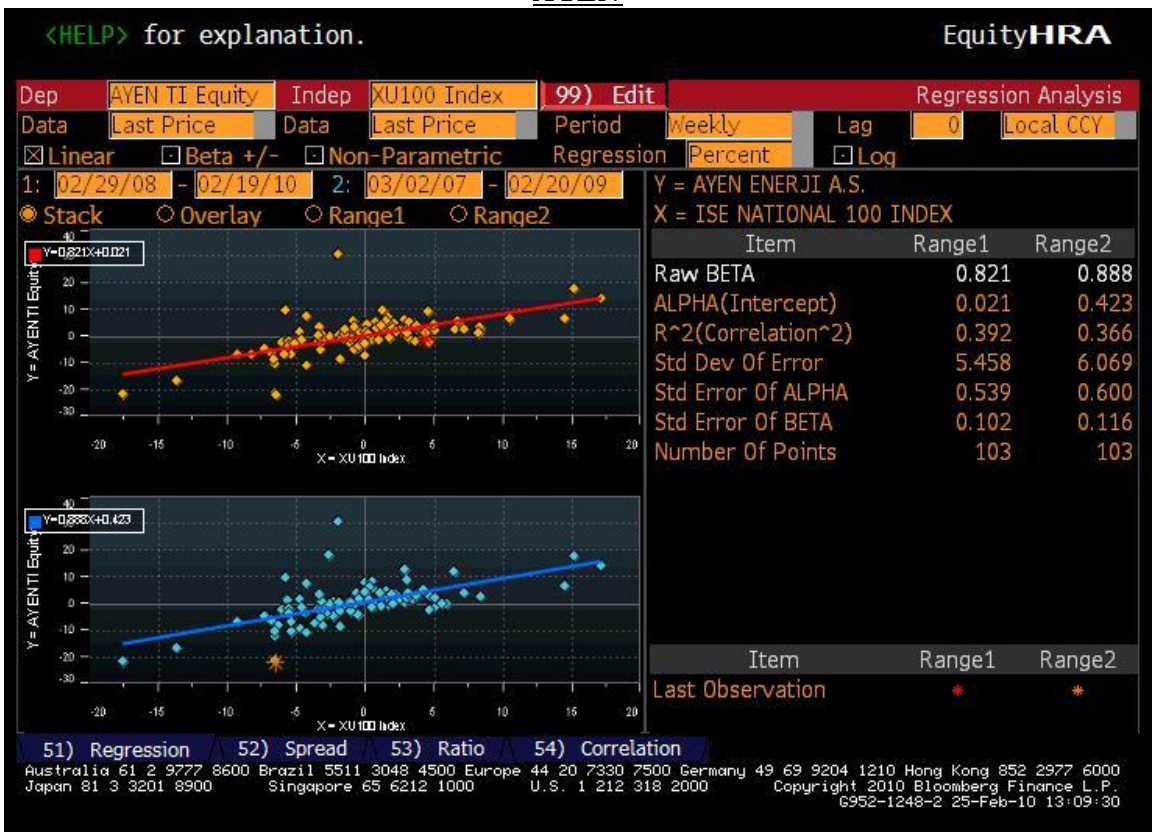
Beta Values of the energy companies traded in ISE 100 derived from Bloomberg:

AK ENERJI



AKSU ENERJI

AYEN



ZORLU ENERJI

ANNEX10

Bank Letter

Akım Enerji Üretim Sanayi Ticaret A.Ş.
Gaziantep

30/07/2010

To Whom It May Concern;

The additional income to be generated from VER Carbon credits and possible utilization of CER Carbon credits in the future are considered during our financial feasibility appraisal of Kalkandere Project and our loan is granted under such consideration
This letter is issued without bearing any responsibility and engagement on our part."

Yapı Kredi Bankası A.Ş.
Gaziantep Şubesi