Voluntary Carbon Standard
Project Description Template

19 November 2007

~~March 18th~~May 15th, 2009

Version 03

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1 Description of Project:

1.1 Project title

Kargilik 24 MW Hydropower Plant, Turkey

(Hereafter referred to as the "Project")

1.2 Type/Category of the project

The project is a not a grouped project or a debundled part of a larger project.

According to the UNFCCC methodologies, it falls into the large-scale project category since its installed capacity exceeds 15 MW_e. Accordingly, the Project is classified in "Project categories: I.D.: Renewable energy generation for a grid". The Project activity is a run-of-river type Hydroelectric Power Plant ("HEPP"), where some of the river is diverted through a penstock to a Power House and let through the turbine to generate power.

The project is a voluntary emission reduction project. It is not a part of any GHG program approved by the VCS Board (e.g. UNFCCC CDM, UNFCCC JI or the Californian Climate Action Registry). Its carbon reductions are not registered under any program.

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

Kargilik 24 MW Hydropower Plant, Turkey has an installed capacity of 24 MW_e.

The Project Activity is in operation since April 25th, 2005, and the net electricity supply of the project activity is as follows:

Table 1. Emission Reductions of the Project

Year	Net Generation [MWh/a]	Emission Reductions tCO_{2e}/a	Information Source
Planning	71,000	43,717	License
2005[1]	33,375	20,550	TEIAS, PMUM
2006[2]	67,316	41,449	TEIAS, PMUM
2007	45,257	27,866	TEIAS, PMUM
2008	56,123	34,556	TEIAS, PMUM

According to the generation license, the total annual net electricity supply is estimated to be 71,000 MWh annually, corresponding to a GHG emission reductions of 43,717 tCO_{2e} every year. Over its projected first credit period of 10 years, the Project Activity is foreseen to reduce 405,281 tCO_{2e} of GHGs in total.

[1] These emission reductions are not eligible under VCS 2007.1
[2] The emission reducitons after 26.03.2006 are eligible under VCS 2007.1

The total crediting period is chosen as 3x10 years, the first 10 year crediting period starting from 28.03.2006. The emission reductions of the Project activity are estimated as below. The emission reductions estimations for the period of 2006-2016 are provided in Table 2.

VCS 2007.1 requires project crediting period start date to be 28 March 2006[3], therefore emission reductions after this date are taken into account;

Table 2. Estimated emission reductions

Years	**Annual estimation of emission reductions in tonnes of CO_{2e}**
2006 (from 28.03.2006 on)	22,827
2007	27,866
2008	43,717
2009	43,717
2010	43,717
2011	43,717
2012	43,717
2013	43,717
2014	43,717
2015	43,717
2016 (until 27.03.2016)	14,013
Total emission reductions **(tonnes of CO_2 e)**	**405,281 over 10 years**
Crediting period	10 years
Annual average over the crediting period of estimated reductions **(tonnes of CO_2e)**	**40,528**

Actual annual emission reductions can deviate from estimated figures and will be calculated based on actual net energy supplied to the grid according to the measurement device readings.

1.4 A brief description of the project:

The Kargilik 24 MW Hydropower Plant, Turkey, which is developed by Tektug Elektrik Uretim Anonim Sirketi (hereafter referred to as the "project owner") is a run-of-river hydropower project located in Kahramanmaras province, Turkey. It utilizes the gross water head of 150m on the Kesis River to generate and supply electricity from clean and renewable resources.

Total installed capacity of the project is 24 MW_e, consisting of 2 turbines, with a predicted net power supply to the grid of 71,000 MWh[4] per annum. The actual performance in 2006 - 2008 has been below this expected value, which can be attributed to the general drought in recent years.

[3] http://www.v-c-s.org/docs/Voluntary%20Carbon%20Standard%202007_1.pdf, p.12
[4] Source: Generation License

The purpose of the Project activity is to generate power in an efficient, clean, reliable and sustainable way with utmost respect on social and environmental reflections and to reduce emissions by partially substituting the electricity supply of fossil fuel fired power plants in Turkey. The consequences of the Project Activity with regards to economic, social and environmental impacts have been assessed and have been judged as being neutral or positive. The project is designed based on 50 years 0 months of economic life, suggesting that it will reduce emissions for a considerably long period of time, even after the crediting period.

The Project Activity is connected to the Andirin transformer station via a 14.4km long 154 kV transmission line. The electricity generation license has been granted on April 24th, 2003. The validity of the license is 40 years 0 months. The majority of the shares of the project owner, Tektug Elektrik Uretim A.S., are owned by Ciltug Isi Sanayi Ticaret Anonim Sirketi ("hereafter referred to as "Ciltug"), based in Gaziantep.

Ciltug, the mother company of the project owner, has provided the Turkish energy sector with hydro-mechanical equipment for more than 35 years with its own product designs, high-quality labour and know how. In this regard, Ciltug can be seen as one of the important and innovative pioneers and contributors to the development of the clean energy sector in Turkey. With the intent of carrying its experience into the energy generation area, the project owner has undertaken the Project activity as one of its first investments in the power generation sector.

After the liberalization of the Turkish electricity market in 2001, Ciltug has been the pioneer in applying EMRA for obtaining hydropower plant licenses under the legally liberal but in practice largely public-dominated market conditions, contributing to the formation of the private hydropower generation in Turkey, making the position of the project participant unique in the market. In this context, the project owner has a unique leadership position in the initialization of the liberal renewable energy market in Turkey by constructing and operating one of the first privately-owned hydropower plants as an IPP[5] under relatively free market conditions at its own risk.

Contributions to Sustainable Development

According to national legislation, no full-EIA[6] has been conducted for the Project or the transmission line. The "EIA is not required" document can be found in
ANNEX **II**. The Project Activity involves generation of electricity from renewable sources. The project enables the substitution of fossil fuel based electricity and contributes positively towards sustainable development in Turkey in terms of social, environmental, technological and economical well-being:

- Power shortages and low quality electricity are common in Turkey, especially during peak demand, due to insufficient capacity. With the Project Activity, a positive contribution is made to the grid

[5] Independent Power Producer

[6] According to the new national EIA regulation, run-of-river type HEPP projects are defined as projects with a reservoir area less than 15 km^2 or with a reservoir volume less than 100 million m^3. A full-EIA Report and a positive confirmation are required for run-of-river type HEPP projects larger than 50 MW installed capacity. For projects between 10 – 50 MW, some criteria are applied to assess whether an EIA is necessary or not. Projects under 10 MW power are exempt from full-EIA requirements. All projects need to prepare and submit a Project Introduction Report (a pre-EIA) to the EIA Directorate in the Ministry of Environment. For the transmission line, a separate EIA for the electricity line is required if the voltage of the transmission line is 154 kV or above.

stability and local quality of electricity, since the generation can be controlled at a certain extent.

- Reduction of:
    - electricity imports of Turkey,
    - dependency on fossil fuels and increased energy security
    - lower supply risks and improvement in price stability;
- Diversification of energy resources and contribution to political stability;
- Reduction of greenhouse gas emissions (e.g. Carbon dioxide) and air pollutants (e.g. particulates, sulphur dioxide, nitrogen oxides etc.) by displacing electricity from fossil fuel based power plants;
- Creation of new jobs in the region during construction and operation phases;
- Support to local economy by procuring available services and equipment locally;
- Treatment of degraded catchments area of the project to control the soil erosion, resulting in regeneration of natural forests and other ecosystems.
- Support to technology and knowhow transfer and development of the renewable energy sector in Turkey;
- Encouraging investments in the region, where the business environment poses several threats and risks to investors;
- In terms of multiplication effects, setting a good example to investors planning similar activities
- Awareness raising activities
- Contribution to a more sustainable energy generation infrastructure by showing that small-scale hydropower projects can bring a high contribution to local sustainable development

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

The project is located in the northern Mediterranean Sea region of Turkey, near Andirin town, Kahramanmaras Province, Turkey. The regulator and the Power House are located close to Kocafakili, Kelesli and Hacimahmutlu neighbourhoods. Andirin Town, where the Project is located at, lies west of Kahramanmaras, a province in the South East of Turkey. The Project will partially divert the Kesis River water flow to a regulator structure and use the water head to drive turbines. This electricity will be then supplied to the national grid.

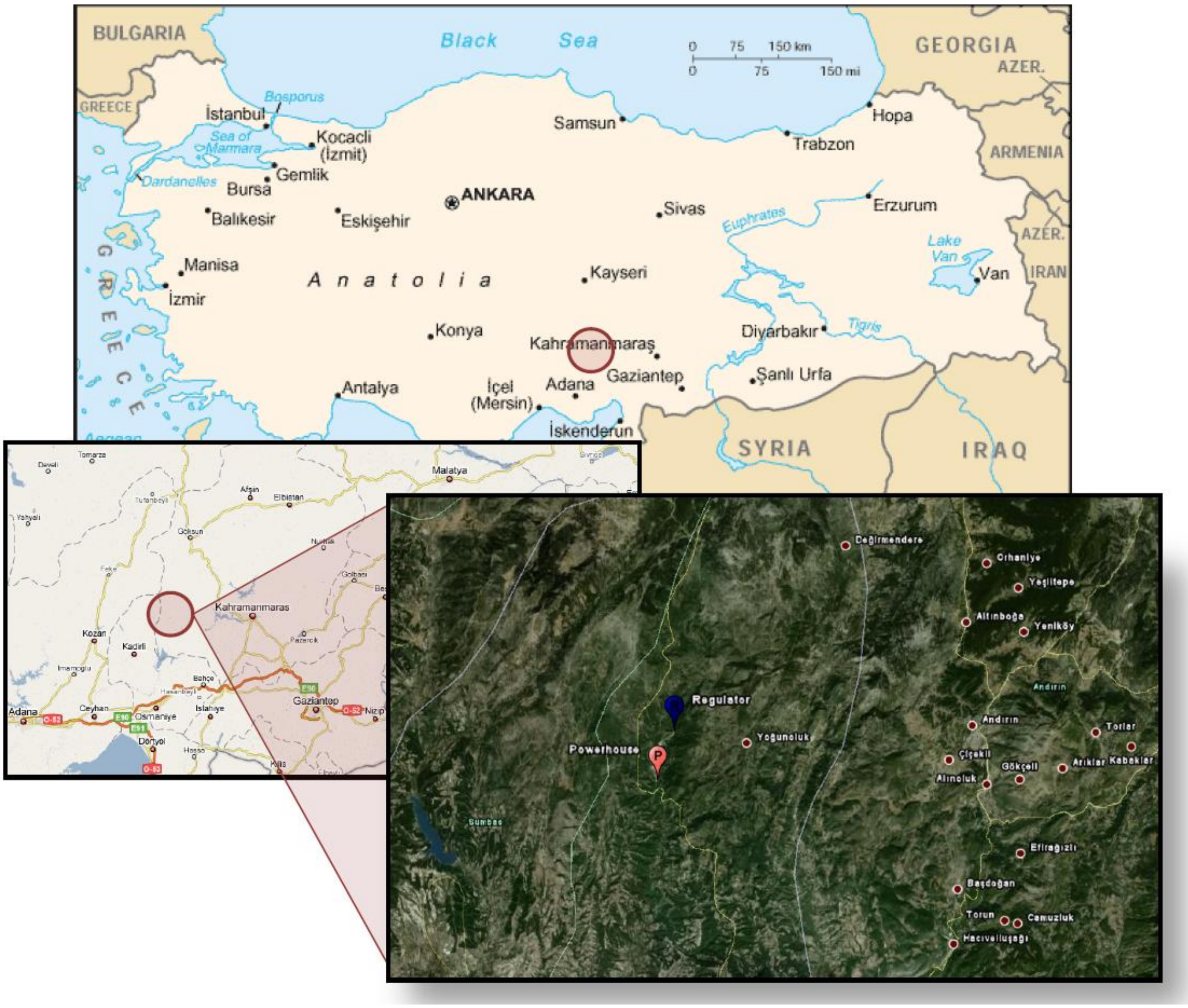

Figure 1. Project Location

The regulator is located at coordinates 37°32'6.04"N and 36°14'23.74"E. The Power House is located at 37°32'57.77"N and 36° 9'6.78"E. The regulator and the Power House have an air distance of ca. 1.7km from each other.

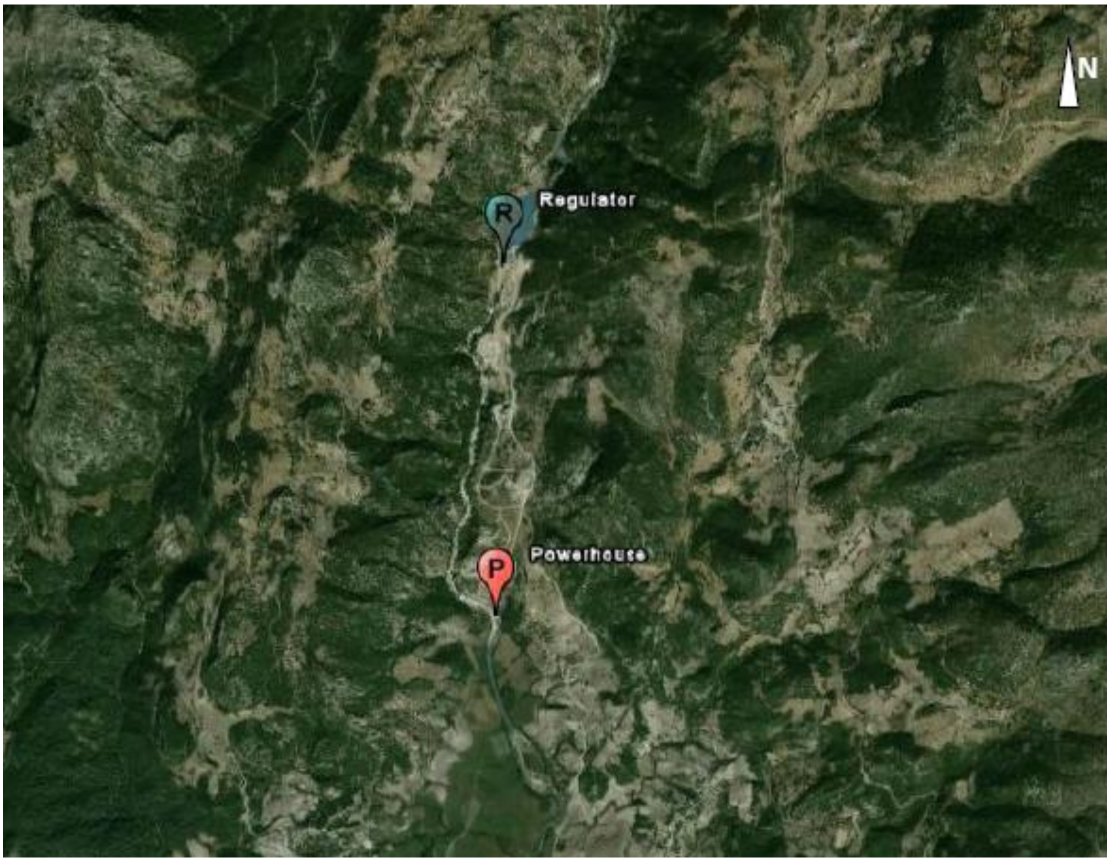

Figure 2. Outline of the Project

Details about the geographical position of the Project Activity can be found in ANNEX III.

1.6 Duration of the Project Activity/crediting period:

Project start date:

The Project start date is April 25th, 2005. Under VCS 2007.1, the project start date is defined as "the date the Project Activity began reducing or removing GHG emissions"[7]. Accordingly, the Project "shall not commence before 1 January 2002"[8]. In relation to contracts entered into before 19 November 2008, validation shall be completed by 19 November 2009 and proof of contracting prior to 19 November 2008 shall be provided." The Project Activity officially started generating electricity[9] on April 25th, 2005 and has a validation contract before the deadline, thus fulfilling all conditions of VCS 2007.1.

[7] http://www.v-c-s.org/docs/Policy%20Announcement%20-%20Validation%20Date%20Deadline.pdf
[8] http://www.v-c-s.org/100908deadline.html
[9] Actual start of electricity generation is about 2 weeks before this date for testing reasons, but the generation during this short period of time has not been invoiced, therefore it cannot be verified.

Crediting period start date:

In agreement with VCS 2007.1 rules, the earliest project crediting period start date shall be March 28th, 2006. The project start date is earlier than this requirement, therefore the crediting period has been defined as March 28th, 2006. The first crediting period is 10 years and ends on March 27th, 2016. Crediting period is planned to be renewed 2 times more, adding up to 30 years in total.

1.7 Conditions prior to project initiation:

Description of baseline and its development

The Project involves the generation of electricity and sales of VCUs. It will help Turkey as a developing country to stimulate and commercialise the use of grid connected renewable energy technologies and markets.

According to VCS 2007.1, the project proponent shall select the most conservative baseline scenario for the methodology. This shall reflect what most likely would have occurred in the absence of the project. The principle of conservativeness as set out in ISO 14064-2:2006 shall apply.

ISO 14064-2:2006 requires the baseline scenario to be identified and evaluated according to the following:

- The project proponent shall select the assumptions, values and procedures that ensure that GHG emission reductions or removal enhancements are not overestimated.
- The project proponent shall select or establish, justify and apply criteria and procedures for demonstrating that the project results in GHG emission reductions or removal enhancements that are additional to what would occur in the baseline scenario.
- The baseline scenario shall set out the geographic scope as applicable to the methodology.

In identifying GHG sources, sinks and reservoirs relevant to the baseline scenario, the project proponent shall:

- consider criteria and procedures used for identifying the GHG sources, sinks and reservoirs relevant for the project;
- if necessary, explain and apply additional criteria for identifying relevant baseline GHG sources, sinks and reservoirs; and
- compare the project’s identified GHG sources, sinks and reservoirs with those identified in the baseline scenario.

Environmental conditions of the project area prior to Project Activity:

The Project is a greenfield investment and project area was not used for any relevant purpose prior to the Project activity. Local communities are mainly involved with forestry-related works, which is based on the national forest-village legal framework (“Or-Koy”), where local people are hired by the government to help with the forestry operations. The project area, which is sparsely populated, is *not* located on a forest area either and was *not* being used for any relevant irrigation or feedstock purposes. *No* issue has been identified by the project owner and local community representers regarding environmental sensitivity, critical habitats, protected flora and flora or similar risks.

It is important to mention that there exists no legislation in Turkey that enforces the reduction of GHGs. The greenhouse gases and emission sources included in or excluded from the Project boundary are:

Table 3. Emission sources

Source		Gas	Included?	Justification / Explanation
Baseline	CO_2 emissions that are displaced due to the Project Activity from electricity generation in fossil fuel fired power plants connected to national grid	CO_2	Yes	Main emission source. The dominant emissions from power plants are in the form of CO_2, therefore CO_2 emissions from fossil fuel fired power plants connected to the grid will be accounted for in baseline calculations.
		CH_4	No	Minor emission sources. This is conservative.
		N_2O	No	
Project Activity	Emissions as a result of Project Activity	CO_2	No	Minor emission sources. As suggested by the baseline methodology, project emissions (PE_y) are assumed to be 0 and will not be considered.

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

The Project consists of the installation of a new, grid-connected, renewable energy power plant. The respective baseline scenario would be the generation of grid-connected power, which would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

The Project Activity is a green field investment, which does not modify or retrofit any existing electricity generation facility. The emission factors are calculated with the most recent data available at the date of VCS PD completion.

The Turkish power grid is an interconnected national electricity grid, where all public and private power generation companies in Turkey are connected to. The supply-demand balance of the grid is managed by TEIAS such that oversupply and shortage of power plants are balanced and regulated technically and financially. The Project is connected and supplying energy to the national grid, so that the electricity supplied by the Project to the grid substitutes the electricity generated by the pool of other plants, which is mostly dominated by fossil fuel fired power plants. By decreasing the fossil fuel consumption, the overall GHG emissions are reduced. In case the Project Activity would not be implemented, the same amount of electricity would be generated from the power plants connected to the grid, which are not in control of the project owner.

In this case, two baseline scenarios are identified;

i. Generation of the same amount of electricity by the pool of other power plants connected to the national electricity grid

ii. Import of the same amount of electricity by the grid operator from neighbour countries

According to ISO 14064-2:2006 (5.4), the baseline scenario is determined by selecting or establishing criteria and procedures for identifying and assessing potential baseline scenarios considering the following:

a) The project description, including identified GHG sources, sinks and reservoirs: Please refer to Section 1.4 and 2.3.

b) Existing and alternative project types, activities and technologies providing equivalent type and level of activity of products or services to the project: The Project involves the generation of electricity and sales of VCUs. It will help Turkey to stimulate and commercialise the use of grid connected renewable energy technologies and markets. In the absence of the Project, the same amount of energy would be covered by the pool of other power plants connected to the grid.

c) Data availability, reliability and limitations: Data regarding hydro power plants in Turkey is not sufficiently detailed. Therefore, relevant information must be assembled from the public information sources such as DSI and TEIAS, as much as possible. Besides that, TEIAS published information on electricity statistics. Regarding emission reduction calculations, only publicly available, official data with certain detail level are used as conservatively as possible.

d) Other relevant information concerning present or future conditions, such as legislative, technical, economic, sociocultural, environmental, geographic, site-specific and temporal assumptions or projections: TEIAS annually publishes capacity projections[10] for the coming 10 years. In describing future conditions and assumptions, these reports are referred to. All references of the information used in this document are given as footnotes.

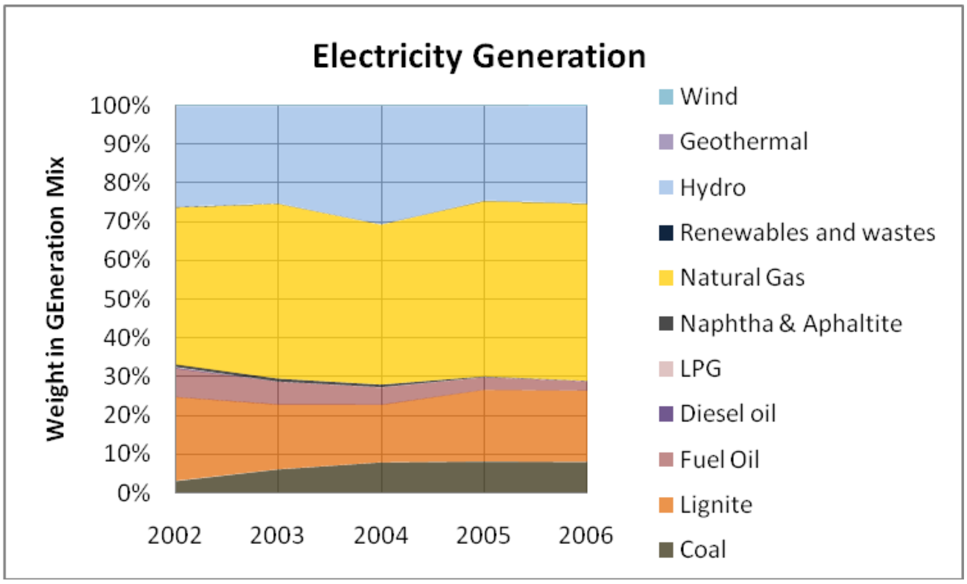

Figure 3. Electricity generation mix in Turkey[11]

Figure 3 above shows the current practice of electricity generation in Turkey; the weight of fossil fuels in electricity generation has been around 70-75% during 2002-2006 and is not expected to change much in the future as highlighted in Figure 4.

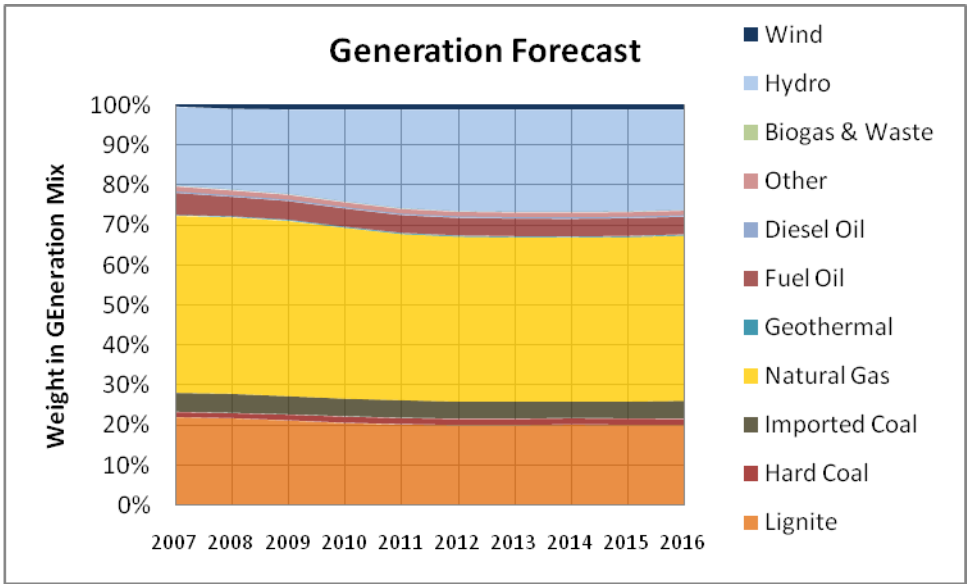

Figure 4. Electricity Generation Forecasts[12]

[10] http://www.teias.gov.tr/projeksiyon/index.htm
[11] Based on TEİAŞ data, http://www.teias.gov.tr/istatistik2005/39.xls, http://www.teias.gov.tr/ist2006/36(06).xls .

The *Hydro* category used in the figures above is a general term covering large dams and river type power plants under different business models (publicly owned, BOTs, Autoproducers, IPPs and concessionaries), therefore it does not represent the Project's category.

The official forecasts as displayed in Figure 4 suggest that in the future power generation in Turkey will be dominated by fossil fuel sources covering more than 70% of the overall electricity supply. In this framework, the continuation of the baseline scenario would mean carrying on this fossil fuel dominated trend.

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

The Project generates electricity from renewable sources and supplies it to the national electricity grid. All publicly and privately owned power plants are connected to the same national grid.

Transmission line operator TEIAS manages the stability and quality of energy supply in the grid through its settlement body, the Electricity Market Financial Settlement Center: PMUM[13]. PMUM regulates and manages electricity supply of the grid per power plant and performs financial settlement activities.

When the Project Activity generates electricity, PMUM ensures that the pool of other power plants generate less energy in order to regulate and smoothen the overall grid supply. This means that as long as the Project feeds the grid with clean, renewable energy, thermal power plants connected to the grid are ordered to operate less. Thus, thermal power plants consume less fossil fuel and their CO_2 emissions are reduced at the extent that the Project supplies electricity to the grid.

In the absence of the Project, the same electricity would be generated by the pool of other existing power plants, increasing the overall fuel consumption and GHG emissions.

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

The project boundary encompasses the physical and geographical site of the Project Activity, including:

- The powerhouse, where the turbines are installed;
- The pipeline between the diversion weir and the powerhouse;
- The diversion weir and the reservoir

The Project is being operated all year round, at reduced capacity in the summer as a result of diminishing water flow.

Technical Description

The project is a run-of-river type hydropower plant with the following technical specifications:

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[12] TEİAŞ capacity projection 2007-2016, p.30. (http://www.teias.gov.tr/projeksiyon/projeksiyon%20Temmuz2007.pdf)
[13] Piyasa Mali Uzlastirma Merkezi (https://pmum.teias.gov.tr)

Table 4. Project Details

Project Details	
License Details	Issue date: April 24th, 2003 Validity: 40 years, 0 months
Installed Capacity	2 x 12 MW_e = 24 MW_e
Estimated Generation	71,000 MWh/a
Realized Generation	33,375 MWh in 2005 67,316 MWh in 2006 45,257 MWh in 2007 56,123 MWh in 2008

The reservoir has a volume of ca. 280,000 m^3. The project has the sole purpose of energy generation. However, it is also capable of controlling river water flow in case of floods, under certain limitations.

Information of Plant Components:

Table 5. Technical Description of the Project

Regulator and water intake structure	The regulator is located on the Kesis River in Kargilik region. Number of intake structures: 3 (rectangular) Intake capacity: 18 m^3/s
Water Conveyance Channel	Dimensions: 3.5 m x 3.5 m Channel length : 1,112.70 m Steel Siphon: 207.62 m, Ø = 2,850mm
Penstock	Ø = 2,500mm Length: 584 m
Turbine	Rotations: 750 rpm Type: Vertical Francis
Generator	Type :synchronized Capacity: 2 x 13.67 MVA Voltage: 6,3 kV Rotations: 750 rpm, vertical Frequency: 50 Hz
Measuring Device	Manufacturer: ELSTER-ABB Quantity: 1 (another 1 as backup) per unit Number of Units: 2 Calibration: ABB (TEIAS approved) Access Right: TEIAS 12th Regional Directorate

The electro-mechanical equipment used for the Project is a proven technology, which is being monitored and controlled with the latest available automated SCADA systems. The Project can be fully controlled from the control room by capable technical personnel. These automation and controlling systems have been imported and installed by a leading technology supplier and is capable of dynamically operate the Project under normal conditions automatically. These systems are able to take necessary actions in case of emergencies as well, preventing or controlling accidents and improve the safety of the personnel. The Project design's engineering reflects current global good practices.

Current legal framework requires the Project to employ technicians for specific activities (certified personnel for the electrical switchgear, for instance). Apart from the regulatory requirements, the personnel need to be trained according to the needs of the Project regarding maintenance, operation, control, safety etc. The Project foresees extensive initial training programs for its employees to ensure their safety and successful operation of the Project according to the design and the budget is being allocated such that these training programs are included.

Below, the sample single line diagram model is shown;

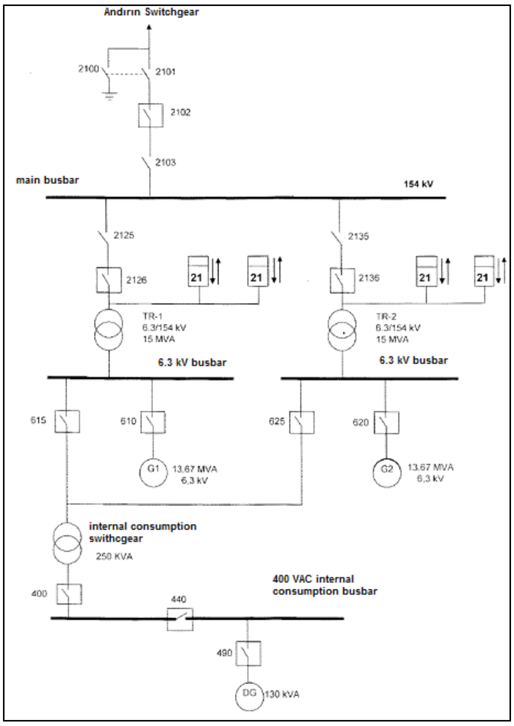


Figure 5. Single line diagram model of the Project

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

The project owner has submitted a project description study regarding the pre-EIA and the Ministry of Environment and Forestry has issued a "full-EIA is not required" certificate. The Project is under implementation and is in compliance with all required relevant regulations. There is no breach of any legislation and all types of required permits are already obtained. The Project is subject to the following laws;

Table 6. Relevant Applicable Laws

Relevant Laws	**Number / Enactment Date**
Electricity Market Law	Nr. 4628 / 03.03.2001
Energy Efficiency Law	Nr. 5627 / 02.05.2007
Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy	Nr. 5346 / 18.05.2005
Environmental Law	Nr. 2827 / 11.08.1983

There are various regulations in connection with these laws as well. Some of the most relevant of these regulations and communiqués are provided below;

Relevant Regulations in the Electricity Market[14]
Regulation Concerning Electricity Demand Forecast
Communiqué Regarding Connection to and Use of Transmission and Distribution Systems in the Electricity Market
Communiqué Regarding Preparation of Retail Contract in The Electricity Market
Communiqué Concerning Principles and Procedures for Selection in the Existence of More Than One Application for Generation of Electricity from the Same Source and on the Same Region
Communiqué Regarding Regulation of Market Management Revenue
Regulation on Principles and Procedures for Granting Guarantee of Origin
Electricity Transmission System Supply Reliability and Quality Regulation
Electricity Market Balancing and Settlement Regulation
Electricity Market Grid Regulation
Communiqué Regarding The Principles and Procedures of Financial Settlement In The Electricity Market
Electricity Market Import and Export Regulation
Communiqué Regarding Regulatory Accounting Guidelines
• Communiqué Regarding Regulatory Accounting Guidelines -Tables
Electricity Market Distribution Regulation
Communiqué Regarding the Meters to be used in the Electricity Market
Communiqué Regarding Wind and Solar Measurements
Electricity Market Customer Services Regulation
Electricity Market Eligible Consumer Regulation
Electricity Market License Fees
Electricity Market Tariffs Regulation
• Communiqué Regarding Determination of Transmission and Distribution Connection Charges
• Communiqué Regarding Regulation of Distribution System Revenue
• Communiqué Regarding Regulation of Retail Service Revenue and Retail Prices
• Communiqué Regarding Regulation of Transmission System Operation Revenue
• Communiqué Regarding Regulation of Transmission System Revenue
Electricity Market Licensing Regulation
Electricity Market Law

The Project is in compliance with the current laws and regulations but is not a mandatory Project. Turkey has no national legal binding emission reduction targets. The transmission line itself is subject to EIA, as electricity transmission lines equal to or higher than 154kV

[14] Source :http://www.epdk.gov.tr/english/regulations/electricity.htm

are subject to the EIA regulation[15]. TEIAS is the responsible party for the EIA of the transmission line.

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

The Project's GHG emission reductions are closely related to its net electricity generation. As a renewable energy investment, the electricity generation of the Project depends on the water flow rate. Therefore, the major risk that substantially affects the projects emission reductions is the amount of precipitation. The Project has been designed according to flow rate measurements of DSI[16] for 20 years close to the Project region, therefore it is expected that the Project's GHG reductions will be in line with technical estimations.

The 2006 and 2007 generations have been lower than the technical expectations. This is attributed to unexpectedly low precipitation patterns in the region, which can also be related to adverse impacts of global warming.

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.

The project owner has no control over or no share in GHG emission sources, which are being substituted by the Project. The Project does not involve the creation of GHG emissions. Therefore, it has not been realized for the purpose of subsequent GHG emission reductions.

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

The Project has not created any form of environmental credit. The emission reductions of the Project have not been registered before, under any other programme.

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

N/A

[15] According to the national EIA regulation
[16] General Directorate of State Hydraulic Works

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

Project Participants:

Table 7. List of Project Participants

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (host)	Tektug Elektrik Uretim A.S. (private entity)	**No**
Turkey (host)	Mavi Consultants (private entity)	No

Tektug (private entity), the project operating company shall be defined as the project participant. Mavi Consultants (private entity) act as carbon consultant for this project and are responsible for the transaction of the credits.

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Tektug Elektrik Uretim Anonim Sirketi
Street/P.O.Box:	Ataturk Bulvari No.89/2
Building:	
City:	Gaziantep
State/Region:	
Postfix/ZIP:	
Country:	Turkey
Telephone:	+90 342 2300325
FAX:	+90 342 2311072
E-Mail:	
URL:	http://www.ciltug.com/
Represented by:	
Title:	Board Member
Salutation:	Mrs.
Last Name:	Tugsuz Guven
Middle Name:	
First Name:	Elvan
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	Mavi Surdurulebilir Kalkinma Proje ve Danismanlik Hizmetleri Ltd. Sti.
Street/P.O.Box:	Baba Efendi S. 5/2
Building:	
City:	Istanbul
State/Region:	
Postfix/ZIP:	34357
Country:	Turkey
Telephone:	+90 212 3270922
FAX:	+90 212 3270925
E-Mail:	info@maviconsultants.com
URL:	www.maviconsultants.com
Represented by:	
Title:	Managing Partner
Salutation:	Ms.
Last Name:	Capalov
Middle Name:	
First Name:	Lale
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

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.):

The host country is Turkey. Turkey does not have any emission reduction obligations. There is no obligation which forced the project owner to plan and realize the Project Activity and there is no other relevant information which would prevent the eligibility of the Project.

1.17 List of commercially sensitive information (if applicable):

The following information is commercially sensitive:

- *The agreement between the carbon consultant and the project owner*
- *Financial details of the Project*

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the Project Activity and explanation of methodology choices:

VCS 2007.1 requires the use of one of its VCS program approved project methodologies[17]*.* VCS methodologies describe either:

- The methodology to determine a projects baseline scenario emissions levels and the process to monitor emissions reductions;
- A performance standard methodology to demonstrate that a project is additional (beyond normal business activities). These methodologies have not been published yet. *The methodologies used in this document are listed below:*

Table 8. Methodologies used in the VCS PD

Subject	***Methodology***
Baseline & Monitoring	The UNFCCC methodology ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", Version ~~8~~ 9 (~~EB44~~EB45).
	The UNFCCC methodology "Tool to calculate the emission factor for an electricity system", Version 01
General Guide	ISO 14064-2:2006
Additionality	Guidance: Voluntary Carbon Standard 2007.1, Section 5.8 Tool: The CDM methodological additionality tool, "Tool for the demonstration and assessment of additionality", v05.2.

[17] http://www.v-c-s.org/methodologies.html

2.2 Justification of the choice of the methodology and why it is applicable to the Project Activity:

According to VCS 2007.1, "VCS Program methodologies shall comply with all requirements in the VCS 2007.1 clause 6.1 to 6.4.4."

Table 9. Justification of Methodological Choices

Subject	***Methodology***	***Justification***
Baseline & Monitoring	Methodology: ACM0002 Ver. ~~8~~ 9 (~~EB44~~EB45): "Consolidated methodology for grid-connected electricity generation from renewable sources"	The choice is justified, because; 1. VCS 2007.1 requires the use of UNFCCC methodologies for baseline and monitoring 2. The Project is a large scale (>15 MW_e) project 3. The Project is in line with the following ACM0002 rules; - The project activity is the installation of a hydro power plant. - The project activity results in new reservoirs and the power density of the power plant is greater than 4 W/m2. - The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available - Project activities does *not* involve switching from fossil fuels to renewable energy sources at the site of the project activity
	Tool: "Tool to calculate the emission factor for an electricity system", Ver. 1.1	This methodology has been used to ensure conservative and proper calculation of the baseline emissions and emission reductions.
	Guidance:	The VCS PD shall include

	ISO 14064-2:2006	identification and assessment of GHG sources, sinks and reservoirs. For this purpose, ISO 14064-2:2006 has been utilized for guidance.
VCS Program Specific Methodologies	*N/A*	*No specific methodology has been approved yet by the VCS.*
Additionality	~~Voluntary Carbon Standard 2007.1, Section 5.8~~ Tool: CDM Tool for the demonstration and assessment of additionality, v05.2	~~*For additionality assessment, VCS has not yet published the "Positive List" and "Performance Standard Additionality Methodologies".*~~ ~~According to Voluntary Carbon Standard 2007.1[18] Section 6.1 and Section 6.4, additionality requirements in Section 5.8 shall apply.~~ Common practice analysis of section 5.8 refers to the GHG Protocol[19], which is also used as a guide. The CDM additionality tool is used to demonstrate additionality, as required by the VCS.

All calculations and choices have been carried out such that the risk of artificially inflating the number of VCUs generated is reduced.

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

According to VCS 2007.1, identification and assessment of GHG sources must be analyzed according to ISO 14064-2:2006 (5.3), as being:

- controlled by the project proponent
- related to the GHG project; or
- affected by the GHG project

The Project Activity is a renewable energy project, aiming at reducing GHG emissions resulting from energy generation activities. Therefore, the Project does not involve any GHG sinks or reservoirs. As suggested, for setting up the logic, the Figure A2 from ISO 14064-2:2006 has been made use of.

The project owner, Tektug Elektrik Uretim A.S., is a small renewable energy project developer in Turkey, only involved in wind and hydro power projects. It develops clean energy projects and is not involved in other type of GHG generating activities. It has no ownership of or control over other GHG sources (like thermal power plants connected to the national grid), therefore the Project itself is the only tool the project owner can utilize to reduce GHG emissions.

For the identification of the baseline scenario, only electricity generation is considered, as the Project has the sole purpose of

~~[18] www.v-c-s.org/docs/Voluntary%20Carbon%20Standard%202007_1.pdf~~

[19] Guidelines for Quantifying GHG Reductions from Grid-Connected Electricity Projects , Section 7.4.2.
Source : http://www.ghgprotocol.org/files/electricity_final.pdf

generating energy. It substitutes specifically the GHG emissions of fossil fuel-fired power plants. In this context, the sources of baseline GHG emissions are defined as the thermal power plants in Turkey.

The thermal power plants, which are identified as the GHG sources of the Project, consume a variety of fuels such as naphtha, coal, lignite or natural gas. Extraction of fuels also generates high amounts of GHGs and the Project is expected to indirectly reduce their consumption as well. However, GHG sources from activities such as methane escape from coal mines or oil extraction activities, their transportation and processing are conservatively not included as GHG sources.

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

ISO 14062-2:2006 requires the project proponent to "select or establish, justify and apply criteria and procedures for demonstrating that the project results in GHG emissions reductions or removal enhancements that are additional to what would occur in the baseline scenario".

Accordingly, "the project proponent shall select or establish criteria, procedures and/or methodologies for quantifying GHG emissions and/or removals for selected GHG sources, sinks and/or reservoirs (see 5.6).

Based on selected or established criteria and procedures, the project proponent shall quantify GHG emissions and/or removals separately for:

a) each relevant GHG for each GHG source, sink and/or reservoir relevant for the project, and

b) each GHG source, sink and/or reservoir relevant for the baseline scenario".

The ISO 14062-2:2006 further requires the project proponent to "establish and apply criteria, procedures and/or methodologies to assess the risk of a reversal of a GHG emission reduction or removal enhancement (i.e. permanence of GHG emission reduction or removal enhancement)". Regarding the Project, no realistic risk of a reversal could be identified, which would result in GHG emission generation instead of reductions.

This standard requires the project proponent to "select or develop GHG emissions or removal factors that

- are derived from a recognized origin,
- are appropriate for the GHG source or sink concerned,
- are current at the time of quantification,
- take account of the quantification uncertainty and are calculated in a manner intended to yield accurate and reproducible results, and
- are consistent with the intended use of the GHG report.

According to this standard, "GHG emission reductions or removal enhancements shall be quantified as the difference between the GHG emissions and/or removals from GHG sources, sinks and reservoirs relevant for the project and those relevant for the baseline scenario. The project proponent shall use tonnes as the unit of measure and shall convert the quantity of each type of GHG to tonnes of CO_{2e} using appropriate GWP[20]s". As described in section 1.7, the Project aims at reducing CO_2 emissions resulting from electricity generation activities. No other GHG types are considered. The appropriate GWP to convert GHG reductions into CO_{2e} for this Project Activity is therefore 1.

In the light of the guidance above, the only viable and realistic baseline scenario is defined as the situation, where all the electricity generated by the Project Activity would be generated by the rest of the power plant pool, which is connected to the national electricity grid.

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):

For assessment and demonstration of additionality, the CDM additionality tool, along with the VCS guidance described in the VCS 2007.1 has been used, as required. According to VCS 2007.1 (Section 5.8), "the project proponent shall demonstrate that the project is additional. The additionality methodology consists of the following steps;

- Identification of alternatives to the project activity;
- Investment analysis to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible;
- Barriers analysis; and
- Common practice analysis.

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

This corresponds to the "Regulatory Surplus" section of the "Test 1: Project Test" of the VCS 2007.1 additionality guidance.

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

This step involves the definition of realistic and credible alternatives to the project activity that can be part of the baseline scenario.

The baseline scenario has been discussed in Section 1.7, and the following alternatives have been identified:

i. Generation of the same amount of electricity by the pool of other power plants connected to the national electricity grid

ii. Import of the same amount of electricity by the grid operator from neighbour countries

iii. The project activity undertaken without being registered as a VER project activity

No other realistic and plausible alternative scenarios to the Project can be identified which deliver electricity with comparable quality, properties and application areas. According to the baseline scenario, the electricity delivered to grid will continue to be fed by a power plant portfolio, which is highly fossil fuel dominated and CO2 intensive (see below).

[20] Global Warming Potential

Outcome of Step 1a: Identified realistic and credible alternative scenario(s) to the project activity

No other realistic and credible baseline alternatives could be identified. From ~~both~~ the alternatives, the Alternative i is chosen as the baseline scenario, as Turkey's national electricity policy favours energy generation rather than import. Small amounts of electricity are being purchased to cover critical peak demand; however neighbour countries are unable to generate high amounts of electricity on which Turkey can base its energy strategies on.
In the absence of the Project, the grid operator TEIAS would be forced to organize the remaining power plants such that they cover the shortage by increasing their generation. After new power plants enter operation, they will also contribute in covering the electricity generation. To take both effects into account, the GHG emission reductions of the Project are calculated by using a weighted average of emission factors of already existing and planned power plants.

Thus, the alternative would be the continuation of the usual electricity generation patterns, which involves highly carbon-intensive power generation. Since the project is not feasible for project participants without the sales of VER credits due to its low IRR, this alternative cannot be considered as the baseline scenario. The output with comparable quality, properties and application areas as the proposed project activity is electricity supplied to the national grid, which is generated from renewable sources. For Turkey, this may include IPP HEPPs, wind farms and biogas/landfill plants. In the project region specifically, there are only *IPP HEPPs* that have been implemented previously or are currently being introduced in the region.
The project owner is not forced in any manner by national laws or regulations to reduce GHG emissions. Since incentive mechanisms for energy generation from renewable resources are insufficient, project owner had to overcome several economic, technical and legal barriers during the planning, permission and realization phases putting its own resources in risk. In this regard, emission reductions would not occur in the absence of the proposed Project Activity.

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

According to VCS 2007.1, the project shall not be mandated by any enforced law, statute or other regulatory framework.

Turkey has no legal obligations to reduce its emission reductions. There is no legal enforcement, which requires private entities to invest in GHG reduction projects. There is no emissions cap imposed to large emitters and Turkey is not a member of any GHG programs.

The project participant is a private entity and the Project is completely a voluntary project that is established for the sole purpose of genarating and selling electricity. It's realization and operation are not mandated by any enforced law, statute or other regulatory framework.

Both alternatives identified above as well as the Project activity are subject to the same regulatory framework, which has been elaborated in Section 1.10 in detail. Hence, both alternatives are consistent with the applicable legislation.

The requirements of this step are satisfied.

According to the CDM additionality tool, for the demonstration of additionality, a barrier analysis or an investment analysis, or both can be conducted. Barrier analysis is applied. This section corresponds to "Step 2: Implementation Barriers" of the "Test 1: Project Test" of the VCS 2007.1 additionality guidance.

STEP 2. Investment Analysis

The Investment Analysis is not applied.

STEP 3. Barrier Analysis

This analysis determines whether the proposed project activity faces barriers that:

(a) Prevent the implementation of this type of proposed project activity; and

(b) Do not prevent the implementation of at least one of the alternatives

Sub-step 3a. Identify barriers that would prevent the implementation of the proposed project activity:

Investment -, technical -, prevailing practice- and other barriers are explained below.

Investment Barrier:

The Project has faced several barriers during financing;

- Costs rise during long planning phase:

  The project planning was started before 1996, however the construction could only be finished in 2005. This long project planning and preparation periods have resulted in high amounts of costs, all of which were borne by the project developer at its own risk. Due to changes in legislation and responsibility complexities, costs have unexpectedly been higher than the budget. The difficulty could only be overcome by additional equity injection of the project owner to the project. In addition, during the long permission period, the cost of the project has escalated with regards to price increases of raw materials such as oil, cement and steel, beside others, adding up further barriers to the realization of the project activity.

- High level of indemnities:

  Project Finance [21] is a common way of finance for renewable energy projects in general. However, due to risk perception in Turkey, project finance –although preferrable- is unfortunately not possible for project owners. In order to secure credit repayments and minimize their exposure to risks, banks only issue credits against strong payment guarantees that would compensate the additional risk they bear. This is also reflected in higher interest rates. Letter of guarantee, personal payment guarantees, pledges, company shares, shareholders' properties and other types of assets are often required by banks at an amount usually exceeding the value of the credit itself. This not only creates difficulties for project owners, but it also creates some risks, as banks often have very strong contractual rights against project owners (such as calling loans in early), which they can exercise whenever they deem necessary.

  As of VCS PD preparation date, no run-of-river type hydropower project is known to have received project financing in Turkey. This is related to the risk perception of banks as well as expected financial performance of such projects and lack of experience of local banks with

[21] The loans are most commonly non-recourse loans, which are secured by the project itself and paid entirely from its cash flow, rather than from the general assets or creditworthiness of the project sponsors, a decision in part supported by financial modelling. The financing is typically secured by all of the project assets, including the revenue-producing contracts.

project financing. High variability in interest and exchange rates, poor predictability of macroeconomic indicators and high real interest rates all make project financing less attractive for banks. The project activity could not receive project finance neither.

Guarantees provided to the financing bank have another adverse reflections as well. As the bank required a high amount of pledge of assets, the company restricted its ability to provide collaterals for further loans. Therefore, providing such a wide array of personal and company guarantees has meant limitation of project owner's capability to realize other projects, which can be classified as opportunity cost[22].

- Insufficient feasibility:

  Although being one of the reputable companies in the Turkish hydropower industry, securing the debt finance has taken a long period of time and efforts because of the following reasons;

  - Country Risk: Turkey faces a relatively high volatility in its economy[23]. The relatively low country credit ratings of Turkey lead to higher interest rates for debt financing, since in general commercial risks are closely correlated with expected returns. This perception results in elevated financing costs for any project in Turkey.
  - Long project horizon: Longer term projects, like hydropower, are more susceptible to risks as all types of foreseeable and unforeseeable risks (economic, political, technical, social etc.) are dispersed over a long period of time. This affects the prevailing circumstances in an adverse way such that these projects experience various difficulties in finding finance with feasible conditions.
  - Project Type Risk: Hydropower plants in Turkey have been strongly hit by climate change, declining precipitation patterns and increased water demands from irrigation in recent years. This directly affects the performance of hydropower plants, especially run-of-river types, as they have limited control over the flow rate. These risks force banks to act more cautiously and selective. Beside hydrological risks, there are also uncontrollable earthquake, landslide and flood risks, which are inherent to such projects. All type of precautions against these natural risks are taken, however this resulted in higher planning and consruction costs.
  - Long Payback Period: Hydropower plants in general have higher initial investment requirements than fossil fuel fired power plants[24]. As a result of initial investment volumes, inter alia, the project has a long payback period mostly due to low electricity prices, higher financing costs, market competition with fully-depreciated old public power plants that do not reflect their real cost of electricity generation onto prices, etc.
  - Need of higher expected returns: The high variability and unpredictability of exchange rates and interest levels in Turkey introduces some important risks associated with investments. As a result of higher economic, political and financial risks, beside

[22]Opportunity cost is the value of the next best alternative foregone as the result of making a decision. Opportunity costs are not restricted to monetary or financial costs: the real cost of output forgone, lost time etc. should also be considered as opportunity costs. Source: http://en.wikipedia.org/wiki/Opportunity_cost

[23] As a result of relatively high foreign trade and current account deficits and high public debt to GDP ratio, inter alia. In 1994 and 2001, Turkey went through two very severe economic crises with significant economic and social reflections.

[24] Source: EMRA, http://www.epdk.gov.tr/lisans/elektrik/kaynakbazinda/kaynakbazinda.htm

others, investors seek higher returns to cover up their risk exposure in agreement with the higher risk-higher return principle, also known as risk-return tradeoff[25]. This means that the project developer has to seek higher returns in order to pay-off the risks it takes.

- Transmission Line: Legally TEIAS is required to construct the HV transmission line to connect the project to the national grid. As a result of annual investment budget of TEIAS, this has not been the case and the project developer had to pre-finance the 14.4 km long 154 kV transmission line in advance[26], putting further difficulties in finding funding for the already high initial investment budget. Although associated costs are later "compensated" by TEIAS by deducting from system usage fees, the official internal price tariffs are structured such that this compensation is not based on actual, realistic up-to-date costs, resulting in a significant loss on behalf of the project participant. This increases the investment volume and affects the Project IRR negatively.
- CSR activities budget: Project developers have undertaken some activities in the region in the framework of Corporate Social Responsibility in order to contribute to the community, which have resulted benefits for local people. On the other hand, these additional works have affected financial parameters of the Project Activity in a negative way.
- Access to finance:
  The overall financing discussion took around 4 years from start to signing the credit agreement. The finance has been costly to the project owner both in terms of negotiation costs as well as credit costs. Highlights of discussions with banks is provided below;

Table 10. Financing process overview

Date	**Explanation**[27]
July 1999	Loan discussions with equipment suppliers start.
September 2000	Equipment suppliers are unable to propose an attractive loan agreement. A Bank ("*Bank*") proposes an offer for a Letter of Guarantee (LoG). However, its conditions are unfeasible for the project owner. Conditions include company shareholders' personal payment guarantee, transferral of all project income to the *Bank*, using the *Bank* for all TE(I)AS payments, pledge of all company shares to the *Bank* etc.
	Project owner replies to the *Bank* with the following LoG amendment demands: • Transferral of project income to the *Bank* parallel to the credit conditions (this means that project income shall not blocked by the *Bank* for the duration of credit's *grace period* of 3 years) • Allowing project owner to use project income during grace period.

[25] The relationship between the amount of return gained on an investment and the amount of risk undertaken in that investment. The more return sought, the more risk that must be undertaken. Source: http://en.wikipedia.org/wiki/Risk-return_spectrum

[26] The cost of this HV TL exceeded 1 million YTL as of construction date

[27] Evidences and details are available to the DOE, if required.

	• The *Bank* shall pay interest to the principal money (from the project income) for the amount, which it blocks. Not fully but partially pledging company shares corresponding to the credit amount
November 2000	Instead of discussing terms and conditions, the *Bank* further asks for additional pledges, such as the *Bank*'s confirmation for any relevant action the project owner makes. During further discussions, the Equity/Debt ratio of the Project was increased up to 50/50 by the Bank, to a much higher ratio than anticipated initially.
2001	Electricity Market Law Nr. 4628 is introduced and the project's technical and financial conditions are changed. Concession terms and conditions become obsolete.
2001	Turkey went through a severe economic crisis with significant social and economic outcomes. Several banks went bankrupt and financial institutions have halted loan discussions. Project owner was unable to obtain debt from banks and finance the Project with its own resources, therefore practically the project was postponed until the crisis was over.
May 2003	Another commercial bank ("Financing Bank") was officially applied for a loan. The LoG from the Bank was being expected meanwhile.
June 2004	The first loan agreement is signed on June 23rd, 2004. The loan is obtained from the *Financing Bank* with a LoG from the *Bank*.

As demonstrated above, finding the financing for the Project was a long, costly and difficult process, clearly showing the barriers related to access to finance. Most of all, the low D/E ratio set by the financiers has created barriers to the project realization, as the Project's budget and its equity requirement were at significant levels for the project owner's own size.

The project owner was in contact with several financial institutions and has acted in a timely manner in good will in supplying all documents and information to banks to enable them efficient assessment of their loan applications. However, banks have either orally declined the request to proceed with the talks further, or they have asked for additional (sometimes at extreme levels and content) guarantees and collaterals from the project owner. The usual practice by banks is never to give a written document regarding denial of funds, but they choose to demand unacceptably high liabilities and costs so that talks either stop or get interrupted. Evidences indicating extreme demands of banks have been shown during the site visit. That was the reason why loan talks took such a long time and why the project owner started talks with different banks one after another. This has been the case for this Project; however it is not realistic in Turkey to expect documents clearly proving fund denials from banks in written form.

On the other hand, the project owner company TEKTUG is established parallel to the issuance of the license, therefore the project owner did not have the adequate financial means to forego various green field investments at the same time. The capital influx was maintained by the mother company, CILTUG, which has a different financial structure which works on the basis of operational capital to be used to finance its ongoing operations. The Project has resulted in a change in the financial structure of CILTUG, as the financier bank required guarantees and collaterals from CILTUG (because TEKTUG did not have sufficient assets) and this resulted in a change in equity and liabilities of CILTUG, since the Project is one of the first hydro power plant investments of the project owner.

Economic conditions and living standards significantly vary in Turkey, with large gaps between regions. Under these circumstances, the project owner's business approach focuses on local development, and it selects its project locations on less developed regions of Turkey. All of the 4 HEPPs of the project owner are located in the south-east and east Anatolia, where income per capita is low and even less than Turkey averages;

Table 11. Income per capita in Project regions, 2001

Locations of HEPPs operated by the project owner	**Income per capita[28] [USD]**
Kahramanmaras [Project Activity]	1584
Osmaniye [another HEPP of Tektug]	1157
Elazig [another HEPP of Tektug]	1704
Adiyaman [another HEPP of Tektug]	918
Turkey average	**2146**

As the table above clearly suggests, the Project has a significant local sustainable development component. On the other hand, investing in underdeveloped regions also mean various difficulties regarding access to local know how, properly educated employees, lack of infrastructure (road, transmission line, business environment etc.) and technology. This has created additional risks and costs for the Project. A recent EBRD[29] report states that Turkey is "still susceptible to a disruption in international capital flows. In particular, growing risk aversion in international capital markets since the summer of 2007 – coupled with the perception of higher country risk of Turkey – have resulted in higher costs of bank funding. Given its history, the widening of risk spreads has been larger than for many other emerging markets"[30].

The annual Doing Business[31] ranking by the World Bank demonstrates that investment environment of Turkey is rather poor and not particularly attractive: Turkey's global ranking is 59th;

Table 12. Selected World Bank Doing Business 2009 Rankings of Turkey

Ease of…	**Trend[32]**	**Rank[33]**
Starting a business	–	43
Dealing with construction permits	↓	131
Employing workers	↑	138
Getting Credit	↓	68

[28] Source: Turkish Statistical Institute, Regional Statistics (www.turkstat.gov.tr). The figures date back to 2001 and no newer information is published.

[29] European Bank for Reconstruction and Development, a bank owned by 61 countries.

[30] EBRD Strategic Review, http://www.ebrd.com/country/country/turkey/request.pdf

[31] www.doingbusiness.org

[32] Compared to 2008 rank

[33] Among 181 countries

Protecting Investors	↑	53
Paying Taxes	↓	68

The ranking of Turkey clearly suggests that framework conditions for investing in Turkey are not especially attractive. This means that the risk spread is high and investors planning new investments in Turkey are required to seek higher returns on equity to cover their risk exposures.

Technological Barriers:

Turkey being a developing country, technology and knowhow transfer plays a significant role in its sustainable development. Successful renewable energy implementations in this regard will enable a faster expansion of the local renewable energy market. Since the soil of the foundation is muddy, sophisticated construction techniques such as concrete injection were utilized, which also increased project costs.

There is lack of skilled labor and educated personnel in the Project area, which is a remote and underdeveloped location with poor infrastructure and business environment. In this sense, the Project owner had to either bring technical staff from distant locations or hire local personnel and train them. The second option is chosen, where several local employees were trained in various skills, contributing to sustainable development and know how transfer.

On the other hand, the Project is one of the first hydropower projects of the project owner. Although the project owner was involved in equipment production for the hydropower industry for decades, it had no experience in actual development of power plants, which involves a much different business model in terms of knowhow, engineering design (regarding choice of the project site, evaluation of technical parameters etc.), time frame, financial terms (regarding price risks, payback period, loan conditions etc.), risk structure (regarding client type such as public or private, natural conditions, local organizational conditions etc.), legal framework and local operations.

Not only designing, but also operating a power plant is another field of activity where the project owner had no experience. The mother company, CILTUG, is a conventional equipment producer working on a contractual basis, where risks and financial terms are clearly defined on a project-basis rather than an on-going operation.

In order to develop the Project, the project owner had to hire experts and assign engineering companies, at its own risk and cost, to successfully design, build and operate the Project. Going into a completely new sector was a significant risk and technological barrier for the project owner, because proper technical design and operation are key factors in renewable energy investments.

Institutional barriers:

The project participant has overcome significant barriers due to bureaucratic and legislative reasons. The project development for the site has begun before 1996. The first pre-feasibility report dates to August 1996. The project was first conceptualized as a BOT[34] project with different technical and financial framework conditions. In the beginning, the Project has been conceptualized in a broader sense with higher capacity. Later on, the plan has been revised by separating the project into two separate

[34] Build – Operate – Transfer business model, which was the only available electricity generation scheme for private investors in Turkey before the market liberalization in 2001

hydropower plants, Kargilik HEPP and Andirin HEPP[35].

Due to various changes, obstacles and difficulties in terms of legal and bureaucratic procedures, the project activity could be taken into operation in 2005. Below, some of the difficulties gone through during licensing and permission procedure have been described;

Table 13. Legal and bureaucratic barriers

August 1996	The first pre-feasibility report is submitted to the Ministry of Energy and Natural Resources ("Ministry") as a BOT model.
August 1997	The Ministry demands a feasibility study.
September 1997	Requested technical information is submitted to TEAS (public electricity company before Electricity Market Law Nr.4628 "Law")
October 1997	A feasibility study is submitted to the Ministry.
April 1998	The Project is presented to the Ministry
August 1998	Project owner is invited by the Ministry to sign the v. Before final signature of the BOT agreement by the Minister of Energy, the draft BOT agreement is sent to State Planning Organization (DPT). DPT requested additional information.
July 1999	After a long period of time, DPT gives its approval to the Project. The BOT agreement is sent to State Council for approval, which was a common procedure before the Law. The draft BOT agreement is sent to relevant bodies for approval.
August 1999	Interim report of the final draft plan is submitted to the Ministry. The Ministry is asked for a capacity expansion.
Febrauary 2000	The validity of Letter of Guarantee, which was submitted to the Ministry before, is extended by the project owner (additional costs). The project owner prepares and sends a PPA draft to TEAS, as TEAS does not have a standard PPA draft.
March 2000	The Ministry requests additional technical information from the project owner. These data is sent by the project owner the following day.
June 2000	The Ministry approves the Project and confirms the Treasury guarantee (for payments and the BOT agreement conditions) with the precondition that the project owner takes the Project into operation latest in the second half of 2002. The project owner accepts it, although time schedule gets very busy, since this means finding finance, ordering equipment, building the plant and obtaining related permits should be organized within 2 years. The project owner immediately starts with preparations.
June 2000	Preparations for construction on site are initiated (land purchase, rent discussions, purchase of heavy construction equipment and trucks, construction of building yard etc.)
June 2000	Tektug, the project company, is established by the mother company Ciltug.
July 2000	The BOT agreement is officially signed by the project owner and the Ministry.
September 2000	Project owner asks TEAS to send a PPA proposal. To prevent further delays, project owner asks the Ministry to ask TEAS to work faster.
January 2001	The project owner asks the Ministry again to ask TEAS to prepare the draft PPA.
March 2001	The new Electricty Market Law Nr. 4628 is introduced.

[35] Another HEPP located close to the Project activity. It is also owned by the sane project owner,.

	The new permit structure applies. Meanwhile, Turkey goes through an economic and financial crisis. Investment environment extremely worsens, as financiers are unable to commit any loans. Suddenly, all already obtained permits, agreements and related rights become obsolete. The BOT agreement becomes ineffective and the construction is halted by the project owner. To regain the already won rights, a law suit is filed by the project owner. The Court concludes that the BOT agreement shall be accepted and the expenses made so far shall be covered by the relevant public authority. The outcome of the lawsuit confirmed the justness of the project owner but does not required the Ministry to carry out mitigation measures; which meant the project owner to lose its rights. In the meantime, EMRA is established. When the court was over, the License Regulation was introduced. The project owner has no option than to start the Project from scratch. The financial losses are high.
June 2002	The Ministry requests the project owner to forgo its arbitration [36] right. The project owner accepts the request in order to be able to realize the Project.
October 2002	The project owner applied EMRA for a license application for a total capacity of 17 MW. The project owner accepted to forgo all its rights from the previous BOT agreement, provided that the license is granted.
July 2003	Upon payment of the license fee, EMRA grants the license on July 23rd, 2003.
September 2003	The project owner asked EMRA to increase Project capacity to 24 MW. In October 2003, EMRA accepts the request.

As demonstrated above, the permission process has taken a very long time. Beside time issues, the costs associated with the whole process have been at significant levels. The steps listed above indicate that more than 7 years passed between the first project application and finalizing the permits. During this period, the electricity market has been liberalized (although the supply side is public-dominated and prices are government-regulated) and new authorities such as EMRA [37] -Energy Market Regulatory Authority responsible for licensing projects- are established.

As a result of the lack of accompanying regulations and communiques as well as organizational restructuring of the public bodies, the Project could not obtain necessary permits for a long time. This not only created a significant amount of up-front costs for the project owner but it also resulted in loss of the incentives, on which the project was designed on.

After the construction began, the permits of the Project were annulled because of the new legislation, without project owner's control or knowledge. This adverse development had a high cost to the project owner, as heavy contruction machinery, trucks and other equipment were already imported and the construction site was already set up. The site had to be closed down and another three years passed until the construction could be started again. Therefore, feasibility of the project is severely reduced throughout the long permission procedure.

[36] **Arbitration**, a form of alternative dispute resolution is a legal technique for the resolution of disputes outside the courts, wherein the parties to a dispute refer it to one or more persons, by whose decision they agree to be bound. Arbitration is most commonly used for the resolution of commercial disputes, particularly in the context of international commercial transactions.
Source: http://en.wikipedia.org/wiki/Arbitration

[37] EPDK, Enerji Piyasasi Düzenleme Kurulu (www.emra.gov.tr)

The Project was initially designed as a BOT, under which the project owner was supposed to have a negotiated BOT electricity sales agreement with the government. Before 2001, such BOT agreements offered project owners to sell their electricity at a fixed price for a guaranteed period of time.

Regarding BOT, with government-guaranteed electricity purchase agreements, project owners would be able to find financing easier, as banks would be more willing to provide loans to a less risky project. After the market liberalization, however, this purchase guarantee concept has been lifted off by the government, resulting in a drop of financiers' interest. Furthermore, before 2001 a public special purpose fund assured hydro power plant operators to cover their financial losses, which resulted from low precipitation patterns. Thus, before 2001 project owners were guarded against poor water flow rate or drought, allowing banks to estimate guaranteed project revenues easily.

These incentives were considered at the beginning for designing the Project, however they were abandoned after the introduction of the Electricity Market Law and project owners were left alone in competing freely with public power plants. As most of these plants were publicly-financed and already amortized, the electricity prices were very low and hydro power plants without above explained incentives lost their attractiveness.

As the supply side is dominated by public generation companies, the electricity price is in practice determined by the government. As a result, electricity prices have been artificially hold low by providing subventions to public generation companies. Lack of incentives for renewable energy and stable electricity prices despite global rise in energy prices have created an inattractive market. Public involvement and control of electricity prices not only distorted the liberal electricity market, which is theoretically based on supply-demand structure, but also caused financial institutions and project developers to lose their interest for energy projects and to assign a higher political risk to project incomes. As of today, electricity prices in Turkey are still government regulated, meaning that political risks are highly integrated to the financial feasibility of energy generation companies.

This negative and abrupt change in the investment environment got worsened after the 2001 financial crisis in Turkey, as banks lost their appetite for new projects and focused on less risky areas.

General high risk of the Turkish investment environment coupled with additional specific risks (political, technical, climatic, financing, organizational etc.) of the electricity market have created an environment, where risk perception of project developers and financiers were elevated. This means that financing costs are high and project developers expect higher returns than usual based on "*high risk-high return*" relationship, also known as risk-return tradeoff[38].

Until the introduction of the Electricity Market Law, the project owner already invested a significant amount of resources in project development and equipment and the process took much longer than expected due to bureaucratic difficulties. Although the project's expected income was not comparable to its risk level anymore, the project owner did not want to give up after so many commitments and although not sufficiently feasible anymore, the project owner realized the project at its own risk.

Governmental Policies:

The Turkish Government has set out some incentives for the promotion of power generation. Some of these incentives are particularly in favour of nuclear and fossil fuel-fired power plant investments, which constitute investment barriers for the project activity as explained below;

[38] The relationship between the amount of return gained on an investment and the amount of risk undertaken in that investment. The more return sought, the more risk that must be undertaken. Source: http://en.wikipedia.org/wiki/Risk-return_spectrum

Table 14. Some of new support mechanisms

Applicability / Legal Reference	Law Clause Description	Explanation
<u>Nuclear power plants</u> (Law on Establishment and Operation of Nuclear Power Plants and Sales of Energy, Enactment date 20.11.2007)	Public-Private Partnership model	This clause enables private nuclear power plant investors to form PPP's and thus minimize their associated political and financial risks. Such an incentive mechanism is not granted to renewable energy projects.
	Electricity purchase guarantee up to 15 years	This period is longer than the purchase guarantee period given to electricity generated by renewable resources, making nuclear energy investments more attractive and less risky compared to renewable energy projects.
	No sales price cap for the generated electricity	There is *no* upper price cap for nuclear energy (contrary to renewable energy), making nuclear power plant investments more attractive.
	Various other supports	Nuclear power plants are supported in terms of free land allocation, incentives for staff training and know how transfer etc., which are not available for renewable energy projects.
<u>Coal fired power plants</u> (Law on Establishment and Operation of Nuclear Power Plants and Sales of Energy, Enactment date 20.11.2007)	Electricity purchase guarantee up to 15 years	This period is longer than the guarantee given to renewable resources and makes the financing of high-capacity coal fired power plants more attractive.

These laws suggest that the government does not prioritize electricity generation from renewable sources over others. Turkey acts as a bridge for petroleum pipelines between the eastern oil producers and western consumers, therefore oil and natural gas have a more privileged position on governmental levels. There exist no official medium- or long-term strategies or any agenda for the development or support of renewable energies in Turkey, except the renewable energy law of 2005, which is negligible in terms of investment incentives in comparison to the laws described in Table 3. This uncertainty about future renewable energy policies creates significant risks and obstacles for potential investors.

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity)

Identified barriers explained in Sub-step 3a would not prevent the implementation of the Alternative i, which is mainly the continuation of fossil fuel power plant dominated power generation, because of the following reasons:

- The baseline scenario is by definition the continuation of the thermal power generation, which constitutes about 70% of overall power generation in Turkey, whereas IPP HEPPs have a negligible share (<1%) in overall generation. This is due to the barriers IPP HEPPs are faced with, in contrast to thermal power generation.

- There is a communiqué[39] for HEPPs regulating water usage rights introducing the following additional barriers:
    - Project applicant shall submit a bank letter of guarantee and lengthen its period if necessary (at significant amounts, which increases financing costs)
    - If more than one project applicant plans a HEPP on the same project site, a tender will be organized and the winner will pay a fee to obtain a license (at significant amounts, which increases financing costs)
    - Feasibility reports will be submitted to DSI and DSI assesses them (although the projects are private investments). Assessment fee will be between 15,000-10,000 TL (ca. 10,000-65,000 USD).
- Investment Barriers: Investment barriers may partially affect ongoing power plant investments; however as the current practice of financial institutions also shows, fossil fuel powered power plant investments often face considerably lower investment barriers as a result of:
    - Smaller initial investment volumes compared to similar-capacity renewable energy projects[40]
    - Familiarity of financiers, investors and authorities with thermal power plants regarding fuel costs, proven technology and risk structure
    - Support mechanisms (e.g. given above) specifically in favour of conventional power plants
- Technological Barriers:
    - Large fossil fuel fired thermal power plants, which constitute a large portion in the forecasts of installed capacity, utilize conventional technologies, which are well known and mature. In Turkey there are technically competent equipment suppliers, technical planners, contractors and maintenance staff regarding conventional mainstream power plant investments. Therefore the baseline scenario, which is the continuation of the thermal power plant dominated electricity generation, does not involve any major identifiable technological barriers.
    - By definition, HEPPs have to be located depending on natural conditions (river basin, local geography etc.) and are therefore subject to local conditions, making HEPPs unique projects with project-specific conditions. On the other hand, locations of thermal power plants can be chosen by the investor based on several factors such as proximity to switchgear stations and transmission lines to minimize initial costs, availability of fossil fuel (a location near a port, railway, coal mine, gas pipeline etc), infrastructure and other factors (transportation, grid stability, educated staff, ease of construction, earthquake proneness etc), service providers and similar framework conditions. Therefore, thermal power plants can be built with better controlled and known parameters and risks. Thermal power generation in Turkey is a well established industry with several domestic equipment and service providers, educated personnel and capable generation companies with sufficient know how and experience. In contrast to the Project, most of the private thermal power plants in Turkey are located

[39] ("Elektrik Piyasasında Üretim Faaliyetinde Bulunmak Üzere Su Kullanım Hakkı Anlaşması İmzalanmasına İlişkin Usul Ve Esaslar Hakkında Yönetmelikte Değişiklik Yapılmasına Dair Yönetmelik", 08.02.2007, Official Gazzette Nr. 26428)

[40] More information about energy investments costs in Turkey are available under http://www.epdk.gov.tr/lisans/elektrik/kaynakbazinda/kaynakbazinda.htm

in well-developed, urban areas with good access to infrastructure, technology and human resources.

- Prevailing Practice: This already involves the continuation of thermal power generation and by definition does not apply.
- Other Barriers: The national energy policy is based on a strategy acting as an energy bridge between the Eastern and the Western oil and gas markets, thereby securing its own fossil fuel supply and gaining strategic position in global energy markets. Turkey is a major route for petroleum tankers from Russia and through pipelines such as Blue Stream for Russian gas, BTC for Caspian oil and gas, the interconnector to Greece and links to Iran (gas) and Iraq (oil). Additional pipelines are under consideration (the Nabucco project and additional gas from Iran and Turkmenistan) [41] . This strategy prioritizes fossil fuels at political levels, whereby renewable resources and their strategic importance are seen as secondary. Thermal power plants also provide a large employment number (planning, construction, engineering, operations, fuel handling, mining and transportation etc.), which creates additional support on governmental levels.

STEP 4. Common Practice Analysis

Common Practice Analysis checks whether the proposed project type has already diffused in the relevant sector and region.

This step corresponds to the "Step 3: Common Practice" of the "Test 1: Project Test" of VCS 2007.1 additionality guidance.

There are several HEPPs, which are either publicly built and operated, or constructed as a BOT model. Among these, the run-of-river type IPP HEPPs in Turkey cannot be classified as common practice. The Greenhouse Gas Protocol[42] suggests that extraordinary circumstances should be present in order to exclude a project from the common practice. The Project activity has been developed before the Electricity Market Law Nr.4628, its construction was started with all its permits already obtained, however the Law made the Project and its permits obsolete. Therefore, the Project activity has been realized under extraordinary legal circumstances, which demonstrates that the Project is not business as usual.

Even among HEPPs, pricing, financing and risks structures for IPP HEPPs are different from public or BOT HEPPs. Therefore, for comparison purposes, only the other IPP HEPPs can be considered.

Hydroelectric power plants (HEPPs) in Turkey can be classified under different clusters;

Table 15. Different organizational models of HEPPs

Type of HEPP (Business model)	**Explanation**	**Do Liberal Market Conditions Apply?**
EUAS and its affiliated partners	EUAS is the public power generation company, owning and operating various thermal and hydroelectric power plants. Some of its power plants have been separated under other affiliated companies for the sake of	No. Publicly owned and operated.

[41] "Turkey's Role in European Energy Security", Katinka Barysch, Center for European Reform, December 2007 (http://www.cer.org.uk)

[42] The Greenhouse Gas Protocol, "Guidelines for Quantifying GHG Reductions from
Grid-Connected Electricity Projects", Chapter 7

	privatization.	
Concessionary Companies	These private companies have been formed before the enforcement of the Electricity Market law Nr. 4628. Concessionary HEPPs have later been transformed into other types of companies to integrate them to the liberal electricity market.	No. These companies have special undisclosed PPAs with the Turkish government. Free market prices do not apply.
Transfer of Operation Rights	Some publicly-owned HEPPs have been leased out to private entities as ToOR for a certain amount of time for operation.	No. Publicly owned.
Autoproducer	Autoproducers generate electricity for the purpose to cover their own energy demand (organized industrial zones, large industrial facilities etc).	No. These plants are not built to sell electricity to the grid.
Build Operate Transfer	BOT HEPPs are built before market liberalization. BOT HEPPs were not subject to free market conditions, and some of their risks (such as drought etc) are covered by the government.	No. These plants have not been planned and constructed based on currently valid market conditions. They have special undisclosed PPAs with the Turkish government.
Independent Power Producer	IPP HEPPs are power plants, which have been constructed and operated under free liberal market conditions, regulated by the Electricity Market Law Nr.4628. They generate and sell electricity to the grid operator.	Yes. These plants have been realized for the sole purpose of generating and feeding electricity to the national grid.

According to ISO 14064-2:2006 (5.4), a baseline scenario using a project-specific approach represents what would occur in the absence of the project. Accordingly, the project proponent shall demonstrate equivalence in type and level of activity of products or services provided between the project and the baseline scenario and shall explain, as appropriate, any significant differences between the project and the baseline scenario. The project proponent shall select or establish, explain and apply criteria and procedures for identifying and justifying the baseline scenario.

Analyzing these types of power plants, it is observed that only IPPs can be regarded as power plants, which are owned and operated by private entities for the sole purpose of generating and selling energy to the electricity grid. Other types of HEPPs are either owned by public bodies or operate on another financial basis with concessionary, competition-distortive conditions like purchase guarantees or risk coverage with contracts. Therefore they cannot be compared with IPPs. As a result, only *IPP HEPPs* have been identified to be similar projects generating electricity with comparable quality under equivalent level and type of activity of comparable conditions. As of today, the legal structure does not allow any more concessionary companies or BOT projects.

The Project Activity itself is an IPP and is one of the pioneers in the Turkish liberal hydroelectricity market. The most recent officially available list of IPP HEPPs as of End of 2007 is given below;

Sub-step 4b. Discuss any similar options that are occurring

Table 16. List of IPP HEPPs in Turkey[43]

HEPP	**Location**	**Installed Capacity [MW]**	**Estimated Generation [GWh]**	**Licesing Date**
BEREKET (DENIZLI)	Denizli	3.7	12	18.11.2004
BEREKET (DALAMAN)	Mugla	37.5	179	18.11.2004
BEREKET (FESLEK)	Aydin	9.5	41	18.11.2004
BEREKET (GOKYAR)	Mugla	11.6	43	14.12.2004
BEREKET (MENTAS)	Adana	39.9	163	18.11.2004
EKIN ENERJI (BASARAN HES)	Aydin	0.6	5	24.02.2005
ERE-BIRKAPILI	Icel	48.5	171	05.06.2003
ERE- AKSU-SAHMALLAR	Antalya	14	45	02.10.2003
ERE- SUGOZU - KIZILDUZ	Antalya	15.4	55	02.10.2003
ESEN-II (GOLTAS)	Mugla	43.4	170	27.12.2004
ELTA (DODURGA)	Denizli	4.1	12	06.07.2004
ICTAS YUKARI MERCAN	Erzincan	14.2	44	28.04.2005
ISKUR (SULEYMANLI HES)	**K.Maras**	**4.6**	**18**	**31.05.2007**
KURTEKS Karasu Andirin HES	**K.Maras**	**2.4**	**19**	**16.02.2006**
MOLU ENERJI (BAHCELIK HES)	Kayseri	4.2	30	09.06.2005
OZGUR ELEK. K.MARAS Tahta HES	**K.Maras**	**12.5**	**54**	**08.04.2005**
PAMUK (Toroslar)	Icel	23.3	112	11.09.2003
SU ENERJI (CAYGOREN HES)	Balikesir	4.6	19	05.09.2003
TEKTUG-KARGILIK	**K.Maras**	**23.9**	**83**	**24.04.2003**
TEKTUG-KALEALTI HES	**Osmaniye**	**15.0**	**52**	**10.07.2003**
TEKTUG-KEBANDERESI	Elazig	5.0	32	18.11.2004
YAPISAN HACILAR	**Malatya**	**13.3**	**90**	**25.05.2004**
YPM ALTINTEPE HES	Sivas	4.0	18	04.01.2005
YPM BEYPINAR HES	Sivas	3.6	18	04.01.2005
YPM KONAK HES	Sivas	4.0	19	04.01.2005
HEPP TOTAL		362.8	1503	

*: Bold-written Projects are located in a similar region as the Project Activity

[43] TEIAS 2008-2017 Capacity Projection, http://www.teias.gov.tr/projeksiyon/ICINDEKILER.htm and http://www.epdk.gov.tr/lisans/elektrik/lisansdatabase/verilentesistipi.asp

According to the list above, as of 31.12.2007 there are 25 IPP type HEPPs in Turkey. The total installed capacity of these power plants is 362.8, up by 36 MW compared to end of 2006.

The installed capacity and generation of IPP HEPPs are small, compared to the HEPPs in Turkey. The share of IPP HEPPs is demonstrated below;

Table 17. IPP HEPP's share in generation[44]

Share of IPP HEPPs	**2003**	**2004**	**2005**	**2006**	**2007**
Gross Generation of IPP HEPPs [GWh]	49.9	N/A	460.7	1,273	1,503
Gross Generation of all HEPPs	33,248	N/A	39,658	45,702	46,226
IPP's Share	0.2%	N/A	1.2%	2.8%	3.3%
Gross Generation of the System [GWh]	140,581	150,698	161,956	176,300	N/A
IPP's share	**0.0%**	**N/A**	**0.3%**	**0.7%**	**N/A**

The table above suggests that IPP HEPPs' share among overall HEPPs is low (3.3% in 2007). Compared to the total system generation, it is even lower than 1%. There is no specific official forecast regarding IPP HEPPs in the pipeline, however the trend suggest that the share of IPP HEPPs will remain marginal.

Recently, the government decided to start publicly investing in new HEPPs[45] to cover the growing electricity demand. This suggests that private companies do not find the market conditions attractive enough to invest in hydropower plants so that public companies have to overtake this responsibility at the expense of damaging liberal market conditions.

This also means the distortion of the liberal electricity market structure, as public generation keeps around the half of the overall energy generation and is able to regulate prices and control energy supply. The status-quo indicates that IPP HEPPs[46] will not become business as usual in future.

As explained above, after the introduction of the Electricity Market Law Nr.4628 only IPP HEPPs are constructed and operated.

As of today, Autoproducers and the public generation companies (EUAS and its affiliated partners) can apply for generation licenses, which are not based on the same financial and operational conditions as IPPs. In other words, only new (license application after the Electricity Market Law) privately owned hydro power plants aiming at only generating and selling electricity have similar conditions with these IPP HEPPs.

Based on this approach, only IPP HEPPs are considered as similar projects generating energy with fairly similar properties. IPP HEPPs in the same region would be more comparable to each other, as prevailing conditions (precipitation patterns, demographics, geographical specifications, regional support mechanisms, economic development level, environment, employment, operational risks, financial willingness of financiers based on project location etc.) may vary according to the region.

Having these differences in mind, 5 (bold-written) relatively similar

[44] Sources: TEIAS Capacity Projections 2005, 2006, 2007, 2008. Please refer to the baseline calculation spreadsheet for further details.
[45] TEIAS foresees taking 5 new public HEPPs into operation in 2008, totaling to 527 MW.
[46] TEIAS foresees 121.4 MW of private HEPPs to be taken into operation in 2008. Please note that there is no information how much of these new privately owned HEPPs are IPPs.

projects are located in a similar region (around Kahramanmaras-Malatya-Osmaniye provinces) with relatively comparable prevailing circumstances. Among these 5 projects, the Project has the **earliest licensing date**, clearly distinguishing itself as the pioneer. This clearly indicates that the Project is not realized as a common practice. Therefore, the Project cannot be regarded as business as usual.

The ISO standard requires taking all precautions and making conservative assumptions in order not to overestimate GHG reductions. Therefore, all calculations and assumptions throughout this document have been carried out with utmost attention on being conservative. Further evidences and references are available to the DOE upon request.

Since HEPPs run by IPPs cover a very limited portion of the Turkish electricity demand, the Project goes beyond a "business as usual" scenario and cannot be considered as a common practice. As a result, the Project is considered to be additional.

According to the VCS 2007.1 additionality guidance, all the three steps of the VCS 2007.1 "*Test 1 – the project test*" are satisfied and the project is additional.

According to the CDM additionality tool, all 4 methodological steps are satisfied and the project is additional.

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:

VCS requires the use of UNFCCC monitoring methodologies[47]. Regarding the Project's type, the ACM 0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", Version 8[48] is used.

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

Monitoring refers to the collection and archiving of all relevant data necessary for determining the baseline, measuring anthropogenic emissions by sources of greenhouse gases (GHG) within the project boundary of a Project and leakage, as applicable. The purpose of monitoring is measurement and analysis of greenhouse gas emissions from a project within its boundary to determine the volume of emission reductions that are attributable to the project.

The Project involves generation of clean energy and substitution of electricity supplied by thermal power plants. The GHG emission reductions are achieved through electricity generation by the Project. Therefore, the net electricity generation by the Project is the parameter, which is going to be monitored.

The net electricity generation by the Project is defined as the amount of electrical energy, which is the difference of gross electricity generation and Project's own electricity consumption. For this purpose, each year the total net electricity generation in [MWh] (Mega-Watt hours) will properly be compiled and reported.

The monitoring plan involves the determination of the baseline emissions occurring within the project boundary during the crediting period. As the project boundary is defined as the national grid of Turkey, the baseline emissions from electricity generation activities in Turkey will be calculated based on publicly available official data.

The leakage during crediting period will not be monitored, which is in agreement with the UNFCCC methodology. The monitoring plan involves the net electricity generation by the Project Activity. More details to monitoring are provided below:

The two measurement instruments are not accessible by the project participant or any other 3rd party except TEIAS. This prevents any intervention and assures the accuracy and quality of the measurements.

- All the data are electronically archived and communicated, thus eliminating the risk of human-based errors.
- The measurement instruments give two types of data;
    - Total gross electricity generated
    - Total electricity consumed by the Project

[47] http://www.v-c-s.org/methodologies.html
[48] http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_YOYKBRCBIK7TSPSB7MQT75SPX75PE8

- The difference of these two parameters is the net electricity generation.
- Verification involves recording monthly readings. PMUM web-site has detailed reporting options, and the relevant data will be copied to a separate Excel-file in order to submit it to the verifying DOE.
- After monthly gross generation and consumption figures are entered to the Excel-file by the project owner, their sum will automatically be calculated by the Excel-file to find annual gross generation and consumption of the Project.
- The difference of annual gross generation and consumption will automatically be calculated by the Excel-file to find annual net generation.
- This figure will be multiplied with the combined margin emission factor to find the emission reductions of the project.

The Excel-file to be used for monitoring has been submitted to the DOE separately.

Self consumption of the Project Activity:

The Project Activity itself consumes some amount of energy for operation. This self consumption is also measured and recorded with the same primary and secondary metering devices. Similar to energy generation, energy consumption is also recorded and accounted for invoicing purposes by the same metering devices.

TEIAS personnel comes on the first days of each successive month and electronically takes the readings of the previous month in terms of gross electricity generation and self electricity consumption (beside others), with a breakdown into 3 time periods (T1 for 06:00-17:00, T2 for 17:00-22:00, T3 for 22:00-06:00) for invoicing. Following this reading, the results are then transmitted on site to the TEIAS network by the TEIAS personnel electronically without any intervention. Based on this reading, a protocol form is printed out, which lists in detail the energy generation and consumption values in a similar way the PMUM web site lists them, and is then signed by the site manager and the TEIAS personnel. Therefore, self consumption values are recorded, read and treated similar to the generation values. Project participants have no access to the metering devices and the self electricity consumption data is of high quality.

Data Source:

At the first days of each month, TEIAS personnel comes to the site and makes a reading regarding the last period from the beginning to the end of the previous month. After taking the reading from the metering device, a standard protocol showing the generation and consumption data is signed by the site manager and the TEIAS personnel. These figures are then used for invoicing purposes.

Based on these monthly protocols, a detailed breakdown of generation and consumption figures is provided by the TEIAS Market Financial Clearing Centre (PMUM) website. The project participant can access its own consumption and generation data through the settlement web site of PMUM (http://pmum.teias.gov.tr) by using their assigned ID and password. After accessing this web site, the project participant is able to call a variety of actual and historical data. These data are used by TEIAS for invoicing, and the same data source will be used for the determination of emission reductions.

Failure of the metering device:

In case of unforeseen problems or failures of the meters or if any difference occurs between primary and secondary device TEIAS has to be informed for necessary maintenance and calibration. An agreement between the project participant and TEIAS will ensure that in case of problems or failures of the meters TEIAS reacts as fast as possible to solve the problem, TEIAS performs the necessary maintenance and calibration. Since the electricity generation data is used for billing and accounting purposes between TEIAS and the project owner, the data is of high quality.

If it is determined by TEIAS that the seal of the primary metering device is torn apart or any intervention is made; correct power amounts are determined over the secondary meter, beginning from the latest measurement when the recorded values of the primary and the secondary metering devices match.

In case of unforeseen problems or failures of the meters or if any difference occurs between primary and secondary device TEIAS will be informed for necessary maintenance and calibration. TEIAS performs the necessary maintenance and calibration.

In case of an unexpected breakdown or problem, emission reductions will be calculated based on TEIAS's official invoices, as they include gross generation and consumption data for each period.

Technical information about metering devices is available to the DOE upon request.

Roles and Responsibilities:

On behalf of the project participants, ***Mrs. Elvan Tugsuz Guven*** (board member of the project owner) from Ciltug Isi San. Tic. A.S. is responsible for the preparation of the monitoring report. This task includes accessing the PMUM settlement web site with a unique ID and password and printing the monthly reports for the crediting period prior to verification. These reports will then be used to fill in the summary table, which is the final document for calculating total emission reductions, basis for VCS VCUs. Both the scans of monthly PMUM reports and the summary Excel table will be prepared by ***Mrs. Elvan Tugsuz Guven*** and submitted to the verifying DOE for verification.

Data Quality, Storage and Accuracy:

Concerning metering system accuracy, project participants have to comply with relevant national legislation. The project must ensure that the metering devices are in line with the technical requirements which are set out by the relevant legislation [49]. Metering devices are technically checked by independent companies for their accuracy and certified. Afterwards, TEIAS also tests both metering devices in order to ensure that the devices satisfy all requirements and are calibrated properly.

The table in the Section II, Article 11 of this communiqué describes the minimum accuracy requirement the metering devices have to fulfil, which are categorized according to the installed capacity. As the rated output of the Project Activity is between 10 MW and 100 MW, each metering device has to have accuracy equal to or better than 0.5%.

The metering devices used in the Project Activity are in line with this requirement. The accuracies are also in agreement with the UNFCCC methodologies; therefore the Project satisfies the data quality requirements.

[49] "Elektrik Piyasasinda Kullanilacak Sayaclar Hakkinda Teblig" (Communiqué for Metering Devices to be used in the Electricity Market)

The collected data will be kept and stored at least for 2 years during the crediting period by the project owner, as required by the methodology used. The PMUM web site also provides relevant data in detail, which is also used as the basis for invoicing. The energy generation and consumption figures are of high quality and in line with the requirements in the ACM0002 methodology;

Table 18. Monitoring Requirements

ACM0002 Requirement	Conditions met?
All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period.	Yes Data will be archived electronically both by the project owner and PMUM settlement web site.
100% of the data should be monitored if not indicated otherwise in the tables below.	Yes All data necessary is monitored. No sampling is done.
All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.	Yes All the equipment are calibrated. Their accuracy is ensured by TEAIS.

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

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Annual net electricity generated by the Project Activity
Source of data to be used:	Measured by TEIAS-approved measurement devices and attained from the PMUM website, which is also used by TEIAS for invoicing.
Value of data applied for the purpose of calculating expected emission reductions	Estimated amount of annual net electricity generation supplied to the grid as given in Table 21.
Description of measurement methods and procedures to be applied:	There are two metering instruments. These devices measure the net electricity supply to the national grid by the Project Activity, all losses before this point are on account of the project participant. Both metering instruments, which continuously monitor and measure the net electricity delivered by the Project Activity, are sealed and only accessible by TEIAS personnel. Official TEIAS data from the PMUM web site will be used for calculating EG_y.
QA/QC procedures to be applied:	See Section 3.2
Any comment:	The annual emissions reductions will be updated by multiplying the ex-ante calculated baseline emission factor by the metering instrument readings. The metering device does not measure the net electricity generation but the gross generation and self consumption separately. Their difference gives the net electricity generation, which is going to be listed on a monthly basis for monitoring purposes.

3.4 Description of the monitoring plan

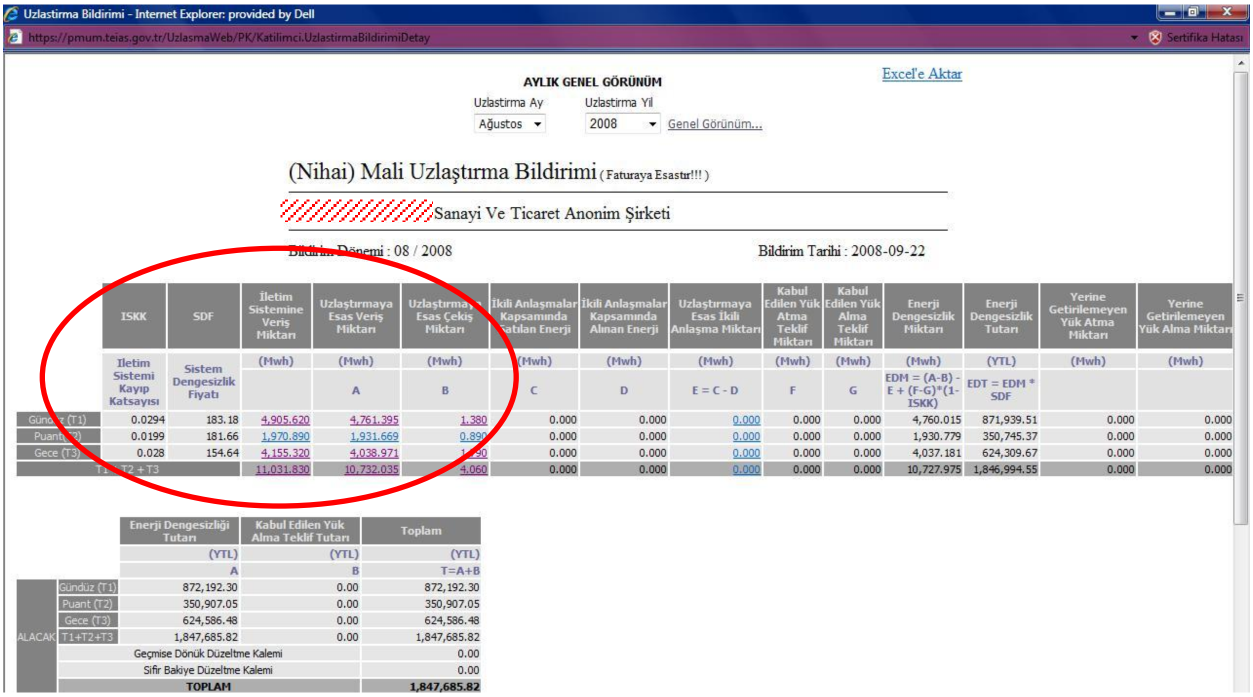
TEIAS invoices according to the net electricity supply, which takes transmission line losses into account. This means that the invoiced amount of electricity is the difference of gross generation, self consumption and transmission line losses, which is determined by TEIAS every month as a certain percentage. For emission reductions calculations, however, transmission line losses shall not be subtracted; therefore the invoiced amount of energy cannot be used. Instead, the monitoring parameter **EG_y** (Project's annual net electricity generation) will be used, which is the difference between the Gross Electricity Generation (GEG_y) and Project Activity's Self Electricity

Consumption (SEC_y):

$EG_y = GEG_y - SEC_y$

PMUM settlement website publishes monthly GEG_y and SEC_y data in detail (with a breakdown into three daily time periods and also their sum), however it does not show EG_y separately. Therefore, for each month GEG_y and SEC_y data need to be recorded and their difference has to be calculated on a monthly basis.

The annual total net electricity generation is then found by summing up monthly EG_y values. An example of a monthly PMUM web site report is provided below:



Uzlastirma Bildirimi - Internet Explorer: provided by Dell

https://pmum.teias.gov.tr/UzlasmaWeb/PK/Katilimci.UzlastirmaBildirimiDetay

AYLIK GENEL GÖRÜNÜM

Uzlastirma Ay: Ağustos — Uzlastirma Yil: 2008 — Genel Görünüm...

Excel'e Aktar

(Nihai) Mali Uzlaştırma Bildirimi (Faturaya Esastır!!!)

[redacted] Sanayi Ve Ticaret Anonim Şirketi

Bildirim Dönemi : 08 / 2008 — Bildirim Tarihi : 2008-09-22

	ISKK	SDF	İletim Sistemine Veriş Miktarı	Uzlaştırmaya Esas Veriş Miktarı	Uzlaştırmaya Esas Çekiş Miktarı	İkili Anlaşmalar Kapsamında Satılan Enerji	İkili Anlaşmalar Kapsamında Alınan Enerji	Uzlaştırmaya Esas İkili Anlaşma Miktarı	Kabul Edilen Yük Atma Teklif Miktarı	Kabul Edilen Yük Alma Teklif Miktarı	Enerji Dengesizlik Miktarı	Enerji Dengesizlik Tutarı	Yerine Getirilemeyen Yük Atma Miktarı	Yerine Getirilemeyen Yük Alma Miktarı
	Iletim Sistemi Kayıp Katsayısı	Sistem Dengesizlik Fiyatı	(Mwh)	(Mwh)	(Mwh)	(Mwh)	(Mwh)	(Mwh)	(Mwh)	(Mwh)	(Mwh)	(YTL)	(Mwh)	(Mwh)
				A	B	C	D	E = C - D	F	G	EDM = (A-B) - E + (F-G)*(1-ISKK)	EDT = EDM * SDF		
Gündüz (T1)	0.0294	183.18	4,905.620	4,761.395	1.380	0.000	0.000	0.000	0.000	0.000	4,760.015	871,939.51	0.000	0.000
Puant (T2)	0.0199	181.66	1,970.890	1,931.669	0.890	0.000	0.000	0.000	0.000	0.000	1,930.779	350,745.37	0.000	0.000
Gece (T3)	0.028	154.64	4,155.320	4,038.971	1.790	0.000	0.000	0.000	0.000	0.000	4,037.181	624,309.67	0.000	0.000
T1 + T2 + T3			11,031.830	10,732.035	4.060	0.000	0.000	0.000	0.000	0.000	10,727.975	1,846,994.55	0.000	0.000

		Enerji Dengesizliği Tutarı	Kabul Edilen Yük Alma Teklif Tutarı	Toplam
		(YTL)	(YTL)	(YTL)
		A	B	T=A+B
ALACAK	Gündüz (T1)	872,192.30	0.00	872,192.30
	Puant (T2)	350,907.05	0.00	350,907.05
	Gece (T3)	624,586.48	0.00	624,586.48
	T1+T2+T3	1,847,685.82	0.00	1,847,685.82
	Geçmişe Dönük Düzeltme Kalemi			0.00
	Sıfır Bakiye Düzeltme Kalemi			0.00
	TOPLAM			1,847,685.82

Figure 6. Official PMUM Report used for Invoicing and Monitoring (figures and project name not relevant)

Using this report, the data extraction for finding monthly EG_y values is visually explained below:

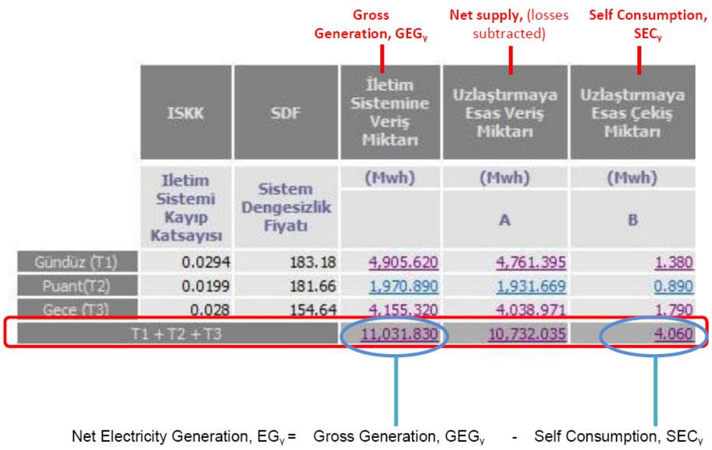


Figure 7. Data extraction from official monthly PMUM generation report (example, figures not relevant)

These monthly figures will be used to fill in the Net Electricity Generation monitoring plan spreadsheat. This table is provided below and will also be submitted to the DOE as a separate spreadsheat-file. The monthly and annual emission reductions are automatically calculated with this table, provided that monthly figures are entered.

Table 19. Sample table for the Monitoring Plan (original spreadsheet file separately submitted)

Project Name:	Kargilik 24 MW HEPP, Turkey
Period start	01.01.2009
Period end	31.12.2009
Data Source	PMUM, http://pmum.teias.gov.tr
Explanation	Please fill in blue cells (copy-paste from PMUM website) and attach printouts of monthly PMUM reports to this summary

	T1	T2	T3	1	T1	T2	T3	2	3 (= 1 - 2)	4	5 (= 3 x 4)
Period	**Gross Energy Generation, GEG**				**Self Consumption, SEC**				**Net Electricity Generation, EG**	**Emission Factor**	**Emission Reductions**
[Month]	**T1 [kWh]**	**T2 [kWh]**	**T3 [kWh]**	**T1+T2+T3 [kWh]**	**T1 [kWh]**	**T2 [kWh]**	**T3 [kWh]**	**T1+T2+T3 [kWh]**	**[kWh]**	**[tCO_2/MWh]**	**[tCO_2]**
January				0				0	0	0.616	0.00
February				0				0	0	0.616	0.00
March				0				0	0	0.616	0.00
April				0				0	0	0.616	0.00
May				0				0	0	0.616	0.00
June				0				0	0	0.616	0.00
July				0				0	0	0.616	0.00
August				0				0	0	0.616	0.00
September				0				0	0	0.616	0.00
October				0				0	0	0.616	0.00
November				0				0	0	0.616	0.00
December				0				0	0	0.616	0.00
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.616**	**0**

The scans or hardcopies of monthly PMUM report print-outs will also be supplied as proof to the DOE in parallel with the spreadsheatenabling the DOE to check their equality. This will ensure a high data quality.

4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

VCS requires the use of UNFCCC tools to assess emission reductions of the Project. For quantifying these GHG emission reductions, the UNFCCC methodology "Tool to calculate the emission factor for an electricity system", Version 01, is utilized to carry out the baseline calculations. The emission reductions are calculated using the UNFCCC methodology ACM0002.

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

The baseline scenario is identified as the substitution of the Project's electricity generation by the pool of other power plants connected to the national electricity grid.

The generated electricity of the Project Activity is of the same type and technical quality as other power plants in operation. The difference between the Project and the baseline scenario is the level of generated emissions during generating the same amount of energy. Thus, the Project reduces GHG emissions stemming from fossil fuel consumption for energy generation. PMUM, TEIAS's (grid operator) market settlement center, ensures that the same amount of energy generated by the Project would be substituted and covered by other power plants connected to the system with equivalent amount and quality in the absence of the Project Activity.

For the identification of the baseline scenario, baseline emissions need to be calculated. For the calculation of the baseline emission calculations, the UNFCCC methodology "Tool to calculate the emission factor for an electricity system", Version 01, has been utilized, as this tool enables the calculation of baseline emissions conservatively.

Official emission amounts of Turkey submitted to UNFCCC are available until 2005 [50] . Unfortunately, there are no more recently published official emission factors or calculations available regarding electricity generation. Therefore, the factor is calculated exclusively for this Project Activity for 2006 and 2007, whereas 2005 national data is used directly[51].

As data source, most recently published official and publicly available data are used in a conservative manner. Data regarding electricity generation are being annually published by TEIAS [52] , the public electricity transmission lines operator. The latest TEIAS data dates back to 2007.

Identification of the OM emission figures for a more recent time window (for 2006-2007) requires calculations using TEIAS data.

According to the monitoring guidelines in AMS I.D to estimate the baseline emissions, the emission factor is to be calculated as per the procedures explained in paragraph 9 (a) & (b). Accordingly, the baseline is the net electrical energy supplied by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_{2e}/kWh) calculated in a transparent and conservative manner as:

a) A combined margin (CM), consisting of the combination of operating

[50] Turkey National Greenhouse Gas Inventory 1990-2005

[51] The methodology suggests to use local data primarily if availale and industry guidelines in the lack of local data.

[52] Turkish Electricity Transmission Co. (www.teias.gov.tr)

margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system".

b) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

For this project, option a) explained above is chosen since the necessary data for option b) is not available.

According to the baseline methodology, the project is eligible and its project emissions are zero, as its power density is over 10 W/m^2.

Step 1: Operating Margin emission factor

The operation margin refers to a cohort of power plants that reflect the existing power plants whose *electricity generation* would be affected by the proposed Project Activity.

The Simple OM emission factor is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including *low operating cost and must run* ("lc-mr") power plants. Examples of lc-mr resources include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation.

The baseline methodology allows a choice among four methods for the calculation of OM emission factor;

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch Data Analysis OM, or

(d) Average OM

There exist no publicly available data for the dispatch data analysis (c) or for the simple adjusted OM (b). Since the average share of electricity generation by lc-mr plants for five most recent years is found to be less than 50%, option (a) is chosen. Option (a), the Simple OM emission factor, can be calculated using either of the two data vintages:

- *Ex-ante option*, where a 3-year generation-weighted average based on the most recent data is used. Monitoring and recalculation of the emission factor is not required, or
- *Ex-post option*, where the data of the year is used, in which the Project Activity displaces grid electricity. Yearly update of the emission factor is required.

The *ex-ante option* is selected to carry out the baseline methodology for the Project.

Step 2: Build Margin emission factor

The build margin refers to a cohort of power plants that reflect the type of power units whose *construction* would be affected by the proposed Project. For this step, a generation-weighted average emission factor is calculated based on a sample of power plants, which have been taken into operation recently.

In terms of vintage data, there are two options available:

The data of the most recent commissioned power plants are being published by the Turkish Electricity Transmission Company (TEIAS) on an annual basis. For build margin calculations, the power plants/units taken into operation between 2003-2006 are included in the cohort of power units. In TEIAS's 2008-2017 capacity projection, new power plants taken into operation in 2007 are given, however their electricity generation is not disclosed, therefore they are not included in this analysis.

Performance revisions, modifications, retrofits and dismantlings of power plants or are stand-alone have been excluded from the samples list for the build margin calculations, as required by the UNFCCC methodology.

Step 3: Baseline emission factor

The Baseline emission factor is the weighted average of the Operating Margin emission factor and the Build Margin emission factor. According to "Tool to calculate the emission factor for an electricity system", the weights shall be 50:50 for the first crediting period. Therefore, the baseline emission factor is the average of the operation margin and build margin emission factors.

Data and parameters those are available at validation

Data / Parameter:	**$GEN_{i,y}$**
Data unit:	GWh
Description:	The gross electricity generation by fuel type i in year y (2002-2007)
Source of data used:	Turkish Electricity Transmission Company (TEIAS) website http://www.teias.gov.tr/ist2007/31(40-07).xls
Value applied:	Table 20. Gross and Net Electricity Generation [GWh] in Turkey
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS annually publishes official data regarding electricity generation. Average share of each source in the overall generation has been calculated.
Any comment:	

Data / Parameter:	**Net Electricity Generation$_y$**
Data unit:	GWh
Description:	The difference between the total quantity of electricity generated by power plants/units and the auxiliary electricity consumption of power plants/units.
Source of data used:	Turkish Electricity Transmission Company (TEIAS) website http://www.teias.gov.tr/ist2007/30(84-07).xls (2002-2007)
Value applied:	Table 20. Gross and Net Electricity Generation [GWh] in Turkey
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS annually publishes official data regarding *total* net electricity generation, but its *breakdown* by fuel type is unavailable.
Any comment:	

Data / Parameter:	**Net Delivery Ratio$_y$**
Data unit:	-
Description:	The ratio of the total Net Electricity Generation to the total Gross Electricity Generation in year y.
Source of data used:	Net Electricity Generation and Gross Electricity Generation data from http://www.teias.gov.tr/ist2007/30(84-07).xls, http://www.teias.gov.tr/ist2007/31(40-07).xls
Value applied:	Table 20. Gross and Net Electricity Generation [GWh] in Turkey
Justification of the choice of data or description of measurement methods and procedures actually applied :	Electricity delivered to the grid by each power plant/unit or fuel source is unavailable. The Net Delivery Ratio$_y$ is used for approximating the net electricity amount delivered to the grid by power plants/units except lc-mr sources (GEN_y).
Any comment:	This is a conservative assumption, since in general thermal power plants consume more energy for auxilaries than e.g. hydro plants. This assumption leads to higher net electricity amounts and lower emission reductions.

Data / Parameter:	**GEN_y**
Data unit:	GWh
Description:	The net electricity delivered to the grid in year y
Source of data used:	Calculation steps (for each year y): 1. Gross electricity generation excluding lc-mr sources = Total gross electricity generation from all sources - total gross electricity generation from lc-mr sources 2. Net electricity generation excluding lc-mr sources = Gross electricity generation except lc-mr sources * Net Delivery Ratio 3. Net electricity delivered to the grid excluding lc-mr sources = Net electricity generation excluding lc-mr sources + Imports
Value applied:	Table 28. Electricity Supply to Grid Equation (4)
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**$FC_{i,y}$**
Data unit:	ton or 1000 m^3
Description:	Total amount of fossil fuel type i consumed by power plants/units in year y
Source of data used:	Turkish Electricity Transmission Company (TEIAS) website http://www.teias.gov.tr/istatistik2005/46.xls (2002-2005) http://www.teias.gov.tr/ist2007/43.xls (2006-2007)
Value applied:	Table 29. NCVs and Emission Factors of Fuels
Justification of the choice of data or description of measurement methods and procedures actually applied :	Fuel consumption breakdown by power plant/unit is unavailable, total consumption amounts are published annually by TEIAS. These data are used together with $HV_{i,y}$ for calculating the NCV of each fuel type i.
Any comment:	The total amount of fossil fuels consumed by power plants/units also includes supplementary firing in cogeneration plants for seasonal heat generation. Since detailed information about it is unavailable, it could not have been filtered out. However, most power plants do not utilize excess heat and this effect can be neglected. Wood waste, liquid sulphur, black liquor, bitumen pyrite, sulphur cake, coke gas, coke oven gas, black furnace gas and refinery gas amounts are not included in the official data, which is a conservative approach.

Data / Parameter:	**$HV_{i,y}$**
Data unit:	Tcal
Description:	Heating values of fuels consumed in thermal power plants in Turkey by the electric utilities
Source of data used:	http://www.teias.gov.tr/ist2007/44.xls http://www.teias.gov.tr/ist2007/45.xls
Value applied:	Table 29. NCVs and Emission Factors of Fuels
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are used together with $FC_{i,y}$ for calculating the $NCV_{i,y}$.
Any comment:	The publicly available data do not sub-categorize the coal amount by type for 2006 and 2007. For harmonization with guideline reference figures, the total of hard coal and imported coal in 2006 and 2007 are broken down with a constant divisor, which is the ratio of hard coal/imported coal in 2005. Please refer to the baseline calculation spreadsheet for further details..

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	TJ/kt or TJ/m^3
Description:	Net calorific value of fossil fuel type i in year y
Source of data used:	Net calorific values of fuels used for power generation are not provided directly, but they are calculated as average by dividing $HV_{i,y}$ by $FC_{i,y}$, both of which are officially published.
Value applied:	Table 29. NCVs and Emission Factors of Fuels
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since NCVs can be calculated, IPCC guideline figures are not used.
Any comment:	2006 and 2007 breakdowns of fuel consumption data do not differentiate between coal types. Therefore the total of hard coal and imported coal in 2006 and 2007 are broken down with a constant divisor, which is the ratio of hard coal/imported coal in 2005. Please refer to the baseline calculation spreadsheet for further details.

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor of fossil fuel type i in year y
Source of data used:	Primary Source (for fuel types included in the report): "TURKEY Greenhouse Gas Inventory, 1990 to 2005", Annex 2, p.92. Source: http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3929.php Secondary Source (for fuel types not included in the national GHG inventory report): The lower limits of the 95% confidence interval stated in the "2006 IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Chapter 1 (energy) Table 1.4.
Value applied:	Table 29. NCVs and Emission Factors of Fuels **Error! Reference source not found.**Table 22. CO2 Emissions of Recent Capacity Additions by Fuel Type
Justification of the choice of data or description of measurement methods and procedures actually applied :	Local Emission factor information is available for certain fuel types, which are submitted to the UNFCCC in the 2005 Turkey National GHG Inventory Report (NIR). For the fuel types which are not described in this NIR, industry guidelines are used instead. The methodology suggests prioritizing the use of local data whenever available.
Any comment:	

Data / Parameter:	**EI_y**
Data unit:	GWh
Description:	Net electricity imports delivered to the grid in year y
Source of data used:	Turkish Electricity Transmission Company (TEIAS) website http://www.teias.gov.tr/ist2007/30(84-07).xls
Value applied:	Table 28. Electricity Supply to Grid
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is the total electricity imported and delivered to the national grid from connected electricity systems (neighbour countries).
Any comment:	

Data / Parameter:	**Electricity Capacity Additions**
Data unit:	-
Description:	Power plants which are most recently taken into operation
Source of data used:	Turkish Electricity Transmission Company (TEIAS) TEIAS Capacity Projection 2007-2016 Study http://www.teias.gov.tr/istatistik2005/7.xls http://www.teias.gov.tr/istat2004/7.xls http://www.teias.gov.tr/istatistik/7.xls
Value applied:	Table 32. Recent Capacity Additions 2003-2006
Justification of the choice of data or description of measurement methods and procedures actually applied :	Average generation values are used for hydro power plants. Since capacity additions between 2004-2006 are not sufficiently large, a representative sample of plants has been included as well, which were taken into operation in year 2003.
Any comment:	As the methodology suggests, isolated and retrofitted power plants/units as well as performance revisions are not regarded.

Data / Parameter:	$\eta_{m,y}$
Data unit:	%
Description:	Average net energy conversion efficiency of power unit m in year y
Source of data used:	UNFCCC methodological tool "Tool to calculate the emission factor for an electricity system" Annex I
Value applied:	Table 22. CO2 Emissions of Recent Capacity Additions by Fuel Type
Justification of the choice of data or description of measurement methods and procedures actually applied :	There is no official efficiency values available based on each power plant or each fuel type in Turkey. It is conservatively assumed that 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.
Any comment:	

Ex-ante calculation of emission reductions:

For the calculation of the combined emission factor, the UNFCCC methodology "Tool to calculate the emission factor for an electricity system" v.1 is used.

The Project mainly involves electricity capacity addition, which reduces CO_2 through the substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. According to the baseline methodology, the emission reduction ER_y by the Project Activity during a given year y is found as;

$$ER_y = BE_y - PE_y - LE_y \qquad (1)$$

where BE_y is calculated as;

$$BE_y = (EG_y - EG_{baseline}) * EF_{grid,CM,y} \qquad (2)$$

$EG_{baseline}$ = 0 since the Project Activity is a greenfield investment according to the methodology.

The baseline methodology suggests that for hydropower projects project emissions need to be accounted. Accordingly, the power density PD of the Project Activity shall be calculated;

$PD = (Cap_{PJ} - Cap_{BL}) / (A_{PJ} - A_{BL})$,

$PD = 24\ MW / 66{,}916\ m^2 = 359\ W/m^2$

Parameter	Definition
PD	Power density [W/m^2]
Cap_{PJ}	Installed capacity of the hydro power plant after the implementation of the Project Activity [W]
Cap_{BL}	Installed capacity of the hydro power plant before the implementation of the Project Activity [W]
A_{PJ}	Area of the reservoir measured in the surface of the water, after the implementation of the Project Activity, when the reservoir is full [m^2]
A_{BL}	Area of the reservoir measured in the surface of the water, before the implementation of the Project Activity, when the reservoir is full [m^2]

Since the power density is higher than 10 W/m^2, the project emissions are zero. According to the baseline methodology, leakage is also zero.

The combined emission factor $EF_{grid,CM,y}$ for the Project is calculated as a weighted average of Operating Margin emission factor and Build Margin emission factor as described in the baseline methodology;

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

Definitions and explanations regarding the equations (1), (2) and (3) are given in Table 25.

STEP 1. Identify the relevant electric power system

A *project electricity system* is defined by the *spatial extent* of the power plants that are physically connected through transmission and distribution lines to the Project Activity and that can be dispatched without significant transmission constraints. There is no officially available and published delineation of the project electricity system and connected electricity systems for Turkey. In the Turkish national electricity system, power plants can be dispatched without significant transmission losses. In this respect, the spatial extent of the Project Boundary is defined as the *national electricity grid* of Turkey.

There are very few power plants, which are not connected to the national grid and are operated stand-alone. These are included in the project boundary, since no detailed data are available to filter them out. However the share of these stand-alone power plants in overall gross generation is negligibly small[53]. These are some of the so-called *Autoproducers*, who mostly cover their own energy demand with their own stand-alone thermal power plants.

No recent or future addition to the national transmission capacity is reported or foreseen, which would enable Turkey to significantly increase its electricity imports. Therefore, a likely transmission line construction is not considered in BM emission factor calculations.

Turkey imports electrical power from and exports to neighbour countries[54], which are defined as *connected electricity systems* for the Project. According to the baseline methodology, imports are regarded as a power source delivering electricity to the grid with an OM emission factor of 0 tCO_2, since electricity being imported is purchased from connected electricity systems located in other countries.

STEP 2. Select an operating margin (OM) method

There exists no nuclear power plant in Turkey, and there is no indication that coal or lignite is obviously used as must-run. Hydro, geothermal, wind power plants and other renewables are included as low-cost/must-run resources, which turns out to be 25.0% of the total electricity generation on average between years 2003 and 2007:

Table 20. Gross and Net Electricity Generation [GWh] in Turkey

<table>
<tr><th colspan="2"></th><th>2003</th><th>2004</th><th>2005</th><th>2006</th><th>2007</th><th>Avg Share</th></tr>
<tr><td colspan="2">Coal</td><td>8,663</td><td>11,998</td><td>13,246</td><td>14,217</td><td>15,136</td><td>7.7%</td></tr>
<tr><td colspan="2">Lignite</td><td>23,590</td><td>22,450</td><td>29,946</td><td>32,433</td><td>38,295</td><td>17.7%</td></tr>
<tr><td colspan="2">Fuel Oil</td><td>8,153</td><td>6,690</td><td>5,121</td><td>4,232</td><td>6,470</td><td>3.8%</td></tr>
<tr><td colspan="2">Diesel oil</td><td>4</td><td>7</td><td>3</td><td>58</td><td>13</td><td>0.0%</td></tr>
<tr><td colspan="2">LPG</td><td>3</td><td>33</td><td>34</td><td>0</td><td>0</td><td>0.0%</td></tr>
<tr><td colspan="2">Naphtha & Asphaltite</td><td>1,036</td><td>940</td><td>326</td><td>50</td><td>44</td><td>0.3%</td></tr>
<tr><td colspan="2">Natural Gas</td><td>63,536</td><td>62,242</td><td>73,445</td><td>80,691</td><td>95,025</td><td>45.4%</td></tr>
<tr><td rowspan="4">low cost-must run</td><td>Renew, & Wastes</td><td>116</td><td>104</td><td>122</td><td>154</td><td>214</td><td>0.1%</td></tr>
<tr><td>Hydro</td><td>35,330</td><td>46,084</td><td>39,561</td><td>44.244</td><td>35,851</td><td>24.8%</td></tr>
<tr><td>Geothermal</td><td>89</td><td>93</td><td>94</td><td>94</td><td rowspan="2">511</td><td rowspan="2">0.1%</td></tr>
<tr><td>Wind</td><td>61</td><td>58</td><td>59</td><td>127</td></tr>
<tr><td colspan="2">Gross Total</td><td>140,581</td><td>150,698</td><td>161,956</td><td>176,300</td><td>191,558</td><td>100%</td></tr>
<tr><td colspan="2">Gross Total, excluding lc-mr resources</td><td>104,985</td><td>104,360</td><td>122,120</td><td>131,681</td><td>154,983</td><td></td></tr>
<tr><td colspan="2"></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Net generation</td><td>135,248</td><td>145,066</td><td>155,469</td><td>169,543</td><td>183,340</td><td></td></tr>
<tr><td colspan="2">Net Delivery Ratio [%]</td><td>96.2%</td><td>96.3%</td><td>96.0%</td><td>96.2%</td><td>95.7%</td><td></td></tr>
</table>

[53] Around 0,2% for recent years (http://www.teias.gov.tr/istat2004/44.xls, http://www.teias.gov.tr/istatistik2005/45.xls, http://www.teias.gov.tr/ist2006/41.xls)

[54] Since 2001: Exports to Georgia, Azerbaijan, Iraq, Syria. Imports from Bulgaria, Iran, Turkmenistan, Georgia. Sources: http://www.teias.gov.tr/ist2006/49.xls, http://www.teias.gov.tr/ist2006/47.xls

Official emission figures of Turkey are available until 2005[55]. No newer official emission figures have been published. Identification of the OM emission figures for a more recent time range requires calculations. Therefore, 2006 – 2007 emissions are calculated.

STEP 3. Calculate the operating margin emission factor according to the selected method

The Simple OM emission factor is calculated as the generation weighted average CO_2 emissions per unit net electricity generation of all generating power plants serving the system, excluding lc-mr sources using one of the following approaches;

- Option A: Based on data on fuel consumption and net electricity generation of each power plant/unit, or
- Option B: Based on data on net electricity generation and the average efficiency of each power unit and the fuel types used in each power unit, or
- Option C: Based on data 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.

Since power plant-specific data required by Options A and B are unavailable, Option C is selected. Option C can be used, as only renewable sources are considered as lc-mr power sources and the quantity of electricity supplied to the grid by these sources is known. According to the "Tool to calculate the emission factor for an electricity system";

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} * NCV_{i,y} * EF_{CO2,i,y}}{GEN_y} \qquad (4)$$

Definitions and details to the parameters in Equation (4) are given in Table 26.

The UNFCCC methodology suggests using local, publicly available data whenever possible. In the lack of local data, industry guidelines shall be used in a conservative manner. As 2005 national emissions figure stemming from electricity generation is publicly available, this figure of 83,680 tCO_2 is used for 2005. Since this figure is unavailable for 2006 and 2007, the calculated emissions figure is used instead. As a result, the Simple OM emission factor is found as below;

Table 21. Calculation of the OM emission factor

Parameter	2005	2006	2007
CO_2 Emissions [$ktCO_2$] (Official Data)	83,680	N/A	N/A
CO_2 Emissions [$ktCO_2$] (Calculated)	78,646	87,805	103,913
GEN_y [GWh]	117,864	127,208	149,198
$EF_{grid,OMsimple,y}$ [tCO_2/MWh]	0.710	0.690	0.696
OM emission factor [tCO_2/MWh]	0.699		

[55] Turkey National Greenhouse Gas Inventory 1990-2005

STEP4. Identify the cohort of power units to be included in the build margin

In this step, a generation-weighted average emission factor is calculated based on a sample of power plants, which have been taken into operation recently. The sample group of power plants/units *m* used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently

(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.

For conducting the calculations, option (b) is selected, because this option results in a larger electricity generation. In terms of vintage data, there are two options available:

Option 1: *"For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period."*

Option 2: *"For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the Project Activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used."*

Option 1 is selected.

The data of the most recent commissioned power plants are being published by the Turkish Electricity Transmission Company (TEIAS) on an annual basis. However relevant data is only available up to year 2006 and there is no published detailed data for 2007 or 2008. Therefore, for build margin calculations, the power plants/units taken into operation between 2003 and 2006 are included in the cohort of power units. Performance revisions, modifications, retrofits and dismantlings of power plants or are stand-alone have been excluded from the samples list for the build margin calculations.

Total capacity additions between the years 2004 -2006 are not sufficiently large to constitute 20% of the system generation; therefore for the sake of conservative approach a representative selection of power plants from 2003 capacity additions is included as well.

The final sample group represents a total generation capacity addition of 38,692 GWh and exceeds 20% of the 2007 gross electricity generation, which is 191,558 GWh. Please see Table 32 for details.

STEP 5. Calculate the build margin emission factor

The build margin emission factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows;

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} * EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (5)$$

The $EF_{EL,m,y}$ is found as;

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} * 3{,}6}{\eta_{m,y}} \quad (6)$$

Definitions and explanations regarding Equations (5) and (6) are given in Table 27.

Table 22. CO_2 Emissions of Recent Capacity Additions by Fuel Type

Fuel Type	Generation of New Capacity Additions, GWh	Average Efficiency, η	Emission Factor, tCO_2/TJ	CO_2 Emissions, $ktCO_2$
Coal	1,125.0	39.0%	91.2	947
Lignite	11,440.0	39.0%	101.2	10,687
Fuel Oil	2,499.9	39.5%	77.4	1,763
Diesel oil	4.1	39.5%	74.1	3
LPG	0.0	60.0%	63.1	0
Naphtha & Aphaltite	322.9	39.5%	73.3	216
Natural Gas	20,767.8	60%	56.1	6,990
Renewables and wastes	127.0	0%	0	0
Hydro	2,237.9	0%	0	0
Geothermal & Wind	167.4	0%	0	0
Total	38,691.9			20,606
Build Margin EF	0.533			

Power plant-specific data are unavailable in Turkey; therefore CO_2 emissions are calculated based on fuel type consumed in sample power plants/units. As data regarding electricity generation efficiency rates in Turkey are not available either, industry guidelines are used[56] in a conservative approach. When selecting the power plants, revisions and dismantled plants have been discarded, as the "Tool to calculate the emission factor for an electricity system" suggests.

[56] This is a conservative approach, as "Best Available Techniques" may not always apply to recently built power plants. Furthermore, for power plants fuelled by multiple fuel types, the fuel type with lower emission factor has conservatively been assumed.

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

The Project has no GHG emissions, because;

- The Project Activity only involves generation of electricity from renewable sources.
- Emission from the reservoir is 0 according to ACM 0002 (Project's power density is above 10 W/m^2).
- No anthropogenic GHGs by sources outside the project boundary that are significant, measurable and attributable to the project activity could be identified. The relevant UNFCCC methodology ACM 0002, p.9 suggests not to consider leakage. Therefore, leakage is 0.

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

Using the Equation (5), the total CO_2 emissions (20,606 $ktCO_2$) of the sample power plants are divided by the total electricity generated (38,692 GWh), and the build margin emission factor $EF_{grid,BM,y}$ is found to be **0.533** tCO_2/MWh.

Calculate the combined margin emissions factor

The combined margin emissions factor is calculated by using Equation (3);

$EF_{grid,CM,y}$ = 0.699 tCO_2/MWh * 0.50 + 0.533 tCO_2/MWh * 0.50
$EF_{grid,CM,y}$ = **0.616 tCO_2/MWh**

Emission Reduction

The yearly emission reduction is thus found by using Equations (1) and (2);

$ER_y = EG_y * EF_{grid,CM,y}$ = 71,000 MWh*0.616 tCO_2/MWh=**43,717 tCO_2**

Table 23. Parameters used and their definitions

Parameter	Definition	Value
$EF_{grid,OM,y}$	Operating Margin Emission Factor in year y	0.699tCO_2/MWh
$EF_{grid,BM,y}$	Build Margin Emission Factor in year y	0.533 tCO_2/MWh
$EF_{grid,CM,y}$	Combined Margin Emission Factor in year y	0.616 tCO_2/MWh
EG_y	Net electricity delivered to grid by the Project	71,000 MWh/a
ER_y	Emission reduction in year y	43,717 tCO_2/a

The project is expected to generate 71,000 MWh in 2009 and the following years. The emission reductions are therefore foreseen as below;

Table 24. Emission reductions of the Project Activity over first the crediting period

Year	**Annual estimation of emission reduction [tCO_2]**
2006	22,827
2007	27,866
2008	34,556
2009	43,717
2010	43,717
2011	43,717
2012	43,717
2013	43,717
2014	43,717
2015	43,717
2016	14,013
Total emission reductions [tCO_2]	405,281 **tCO_2 over 10 years**
Length of the first crediting period	**10 years**
Annual average of estimated reductions over the first crediting period [tCO_2]	40,528

The table above demonstrates estimated GHG emission reductions over the crediting period. The crediting period is planned to be extended 2 times to a total crediting period of 30 years.

5 Environmental Impact:

Legally, during planning and construction the project owner was legally obliged to conduct a local stakeholder consultation process according to rules and procedures stated in relevant EIA[57] legislation. The Project Activity poses no relevant environmental impacts and risks because:

- The Project is not subject to the EIA regulation, as of the date of the BOT agreement signature date. This has been confirmed by an official letter from the Ministry of Environment and Forestry, which is available to the DOE if requested. However, the Project is required to be in line with environmental laws and regulations and the Project is being operated according to these rules. This has also been assured by periodic inspections by relevant public bodies and the water usage agreement between the project owner and State Hydraulic Works (DSI).

- Environmental impacts of the Project are not considered to be significant by the project participant and local stakeholders. Before the construction phase, representatives of local stakeholders have been contacted to receive their comments about the project. In response, no relevant comment suggesting potential negative environmental or social impacts has been expressed. The project owner has paid utmost attention to minimize any impact during construction and operation.

- The Project is a low-impact hydropower plant, where the by-passed riverside has a rocky geography. The regulator is designed on the river bed, which has high slopes on both sides, and did not overlap with any agricultural land. There are *no* flood plain ecosystems or protected species or cultural heritage areas, which would be affected by the Project.

- The Project has resulted in no or low impact on agriculture or local life styles. Natural habitat in and around the 1.5 km long by-passed river side will be maintained by maintaining a 150 lt/sec minimum water flow rate, which is also ensured by the water management agreement concluded with State Water Works (DSI). The flow regime will qualitatively and quantitatively simulate the natural flow regime.

- The project does not result in any disconnections of lateral rivers. Minimum water depth and necessary structures for fish migration are provided. The Project furthermore is designed to ensure sufficient transport of sediments. The reduction in water level will not lead to drying of the water course, which is ensured by the project owner.

- Any risk of erosion on the Project site has been minimized by planting 5,500 new trees by the Project owner. This also contributed to environmental performance of the Project.

- During construction, surface soil has been gathered and stored separately. After the construction, this soil has been used for landscaping purposes. Therefore, the Project did not result in loss of high quality soil. Moreover, solid and liquid waste (including waste oil of the transformer) during operation is being disposed of properly, in agreement with the relevant regulations.

[57] Environmental Impact Assessment Regulation (ÇED Yönetmeligi)

- The Project itself did *not* result in any loss of trees. However, the construction of the transmission line, which is TEIAS's responsibility, has resulted in some minor loss of trees. The project owner paid significant amount of fees to relevant public authorities to mitigate this loss, which is then used by relevant public authorities for aforestation purposes. Therefore, the Project's impact is neutralized, which is ensured by the regulation. In addition, as a Corporate Social Responsibility activity of the project owner, 4,000 almond trees, 1,000 chestnut trees and 500 fruit trees have been planted on Project Site, which is financed by the project owner. The maintenance of these trees is also financed by the project owner.

6 Stakeholders comments:

During planning and construction phases, local stakeholders have been contacted by the project owners to inform them about the Project and to gather their comments. Vis-à-vis meetings with the following stakeholders have been organized:

- Governor of Kahramanmaras
- Director of Kahramanmaras Regional Forestry Department
- Director of Andirin Forestry Department
- Village headman of Bulgurkaya village

The common outcome of these meetings was positive and contacted stakeholders are in favour of the Project.

The operators who were employed during project construction phase have been trained by the Chamber of Mechanical Engineers, contributing to capacity building and knowhow transfer. Land purchases in the area have been performed such that land owners were compensated a multiple of the real land value.

About 90 people were employed during construction, and a significant portion of them were local people. 18 personnel are being employed during operation, which also includes local people. This contributes to local economy and leads to improvement in living standards.

Local people, who sold their land, also supported the Project, as the sales price was much beyond the market value of these lands. This also supported the local economy. Because of some land registry issues (such as possession ambiguities or lack of land title deeds), some land is expropriated, whereby the land owners were compensated with payments at least double of the market values. Therefore, the Project did *not* result in local disapproval.

The Project has resulted in the creation of new jobs in the project region and improvement in local roads, contributing to living standards in the region. Moreover, the project owner has provided contribution in kind to the local community, although these activities are not required legally. As a result, the community is supporting the project and they believe that it creates a momentum for local sustainable development.

7 Schedule:

The project has started operation in April 2005. According to VCS 2007.1, the Project start date corresponds to the date on which the Project starts reducing GHG emissions, which is the official operational start of April 24th, 2005. The VCS 2007.1 suggest the crediting period start date of March 28th, 2006, which is chosen for the Project activity.

The Project has an electricity generation license valid from April 24th, 2003 for a period of 40 years 0 months. The crediting period for GHG emission reductions is 10 years, and it is planned to be extended 2 more periods to a total crediting period of 30 years. Therefore it expected that the Project will continue reducing GHG emissions even after the crediting period.

The monitoring is planned to be carried out annually. Each year, an accredited DOE will verify the GHG emission reductions, which have been monitored according to the monitoring plan. The project owner will submit the relevant information and documentation for verification to this 3rd party annually.

8 Ownership:

8.1 Proof of Title:

The generation license and the Project is owned and operated by Tektug Elektrik Uretim A.S. Evidence for the title of ownership is available upon DOE's request.

The sales rights of the GHG reductions belong to the carbon consultants, ensured by a contractual arrangement with the project owner. The conditions and details of this arrangement are commercially sensitive. Mavi Consultants have the rights to act on behalf of the project owner for the development and sales of the carbon credits.

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

N/A

9 Annexes

ANNEX I

BASELINE INFORMATION

Table 25. Definitions and Explanations regarding Equations (1),(2),(3)

Parameter	Definition	Explanation
ER_y	Emission reductions in year y (tCO_2/yr)	Calculated using Equation (1)
BE_y	Baseline emissions in year y (tCO_2/yr)	Calculated using Equation (2)
PE_y	Project emissions in year y (tCO_2/yr) Project emissions involve direct emissions (such as fossil fuel consumption of construction equipment or vehicles for on-going operations and maintenance).	0 tCO_2/yr This is suggested by the baseline methodology, and the quantity of fossil fuels used for the Project Activity is negligibly small.
LE_y	Leakage emissions in year y (tCO_2/yr) Leakage is emissions arising due to activities such as power plant construction, fuel handling and land inundation.	0 tCO_2/yr The baseline methodology suggests not considering these emission sources as leakage.
EG_y	Electricity supplied by the Project Activity to the grid (MWh)	Net electricity generation already supplied. The monitoring methodology ensures proper monitoring of this figure annually.
$EG_{baseline}$	Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh)	0 MWh No modification or retrofitting.
$EF_{grid,CM,y}$	Combined Margin CO_2 emission factor (tCO_2/MWh) for grid connected power generation in year y	Calculated using Equation (3)
$EF_{grid,OM,y}$	Operation Margin CO_2 emission factor (tCO_2/MWh) for grid connected power generation in year y	Calculated based on the "Tool to calculate the emission factor for an electricity system"
$EF_{grid,BM,y}$	Build Margin CO_2 emission factor (tCO_2/MWh) for grid connected power generation in year y	Calculated based on the "Tool to calculate the emission factor for an electricity system"
w_{OM}	Weighting of operation margin emissions factor (%)	50% (default value), as "Tool to calculate the emission factor for an electricity system" suggests
w_{BM}	Weighting of build margin emissions factor (%)	50% (default value), as "Tool to calculate the emission factor for an electricity system" suggests

Table 26. Definitions and Explanations regarding Equation (4)

Parameter	**Definition**	**Explanation**
$EF_{grid,Omsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)	Calculated using Equation (4) Data in Table 31
$FC_{i,y}$	Amount of fossil fuel type *i* consumed in the project electricity system in year y (ton or $000m^3$)	
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type *i* in year y (TJ/kt or TJ/mil m^3)	Data in Table 29
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type *i* in year y (tCO_2/TJ]	Data in Table 29
GEN_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including lc-mr power plants/units, in year y (GWh)	Data in Table 28
i	All fossil fuel types combusted in power sources in the project electricity system in year y	

Table 27. Definitions and Explanations regarding Equations (5) and (6)

Parameter	**Definition**	**Explanation**
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y [tCO_2/MWh]	Calculated using Equation (5) Data in Table 22
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y [MWh]	Data in Table 32
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y [tCO_2/MWh]	
$EF_{CO2,m,i,y}$	CO_2 emission factor of fuel type i used in power unit m in year y (tCO_2/TJ)	Data in Table 29
$\eta_{m,y}$	Average net energy conversion efficiency of power unit m in year y (%)	Data in Table 22
m	Power units included in the build margin	
y	Most recent historical year for which power generation data is available	

Table 28. Electricity Supply to Grid

	2003	2004	2005	2006	2007
Net Generation, GWh	**135,248**	**145,066**	**155,469**	**169,543**	**183,340**
Net Delivery Ratio	**96.2%**	**96.3%**	**96.0%**	**96.2%**	**95.7%**
Imports, GWh	**1,158**	**463.5**	**635.9**	**573.2**	**864.3**
Net Delivered to Grid, exc. Lc-mr	**102,161**	**100,923**	**117,864**	**127,208**	**149,198**

Table 29. NCVs and Emission Factors of Fuels

NCV [TJ/kt or TJ/mil m^3]	**2003**	**2004**	**2005**	**2006**	**2007**	**Emission Factors [tCO_2/TJ]**
Hard Coal	14.4	15.1	13.6	18.1	18.2	94.6
Imported Coal	25.7	25.5	24.7	24.5	25.0	89.5
Lignite	7.5	7.6	5.9	6.9	6.9	101.2
Fuel Oil	40.1	39.9	40.2	40.2	39.8	77.4
Diesel Oil	43.3	42.4	42.8	42.7	43.1	74.1
Lpg	44.1	45.9	46.0	0.0	0.0	63.1
Naphta	40.0	44.0	44.3	43.9	43.2	73.3
Natural Gas	37.2	36.9	37.3	37.0	36.6	56.1

Table 30. CO_2 Emissions Breakdown by Fuel Type

CO_2 Emissions, $ktCO_2$	**2003**	**2004**	**2005**	**2006**	**2007**
Hard Coal	2,097	1,896	2,197	3,831	4,171
Imported Coal	4,986	7,388	7,858	7,424	8,080
Lignite	26,933	25,836	29,010	35,539	42,478
Fuel Oil	8,884	7,421	6,235	5,428	6,938
Diesel Oil	45	91	90	194	160
Lpg	2	37	37	0	0
Naphta	775	674	275	43	36
Natural Gas	26,299	27,571	32,943	35,346	42,050
Total Calculated	70,021	70,915	78,646	87,805	103,913
Official Data	68,973	70,499	83,680		

Table 31. Operation Margin EF Calculations

Operating Margin EF	**2005**	**2006**	**2007**
CO_2 Emissions, $ktCO_2$ (Official Data)	83,680	N/A	N/A
CO_2 Emissions, $ktCO_2$ (Calculation)	78,646	87,805	103,913
Net electricity supplied to grid, GWh	117,864	127,208	149,198
OM Emission Factor, [$ktCO_2$/GWh]	0.710	0.690	0.696
EF_{OM} average 2005-2007, $ktCO_2$/GWh	0.699		

Table 32. Recent Capacity Additions 2003-2006

Year	**Plant**	**Installed capacity (MW)**	**Fuel Type**	**Fuel Considered as**[58]	**Average Generation (GWh)**	**Commissionary date**
2003	SAMSUN-1 GRUP I-II-III-IV-V-VI-VII	131.3	FUEL-OIL	Fuel Oil	876.0	03/03/2003
2003	SAMSUN-2 GRUP I-II-III-IV-V-VI-VII	131.3	FUEL-OIL	Fuel Oil	876.0	03/03/2003
2003	ZORLU ENERJI(SINCAN)GR-I	39.7	N.GAS+D.OIL	Natural Gas	297.8	31/05/2003
2003	AK-EN(BATI CIM) GRUP II-III-IV-V	25.4	N.GAS+NAPHTA	Natural Gas	190.5	13/03/2003
2003	ENERJI-SA(CANAKKALE) GR-BT	21.6	N.GAS+NAPHTA	Natural Gas	161.8	00.11.2003
2003	ENERJI-SA(Mersin) GR GT	41.7	N.GAS+NAPHTA	Natural Gas	312.0	05/10/2003
2003	ENERJI-SA(Mersin) GR BT	21.6	N.GAS+NAPHTA	Natural Gas	161.8	22/11/2003
2003	AK-EN(BATI CIM) GRUP BT	14.5	N.GAS+NAPHTA	Natural Gas	108.8	26/10/2003
2003	KAREN GRUP I-II	24.3	FUEL-OIL	Fuel Oil	182.6	14/06/2003
2003	KAREGE GR I-II-III(ARGES)	34.0	N.GAS+F.OIL	Natural Gas	255.2	30/07/2003
2003	BATMAN GRUP I-III	128.0	DAM	Hydro	312.2	14/11/2003
2003	BATMAN GR II-IV	70.0	DAM	Hydro	170.8	09/12/2003
2004	TUPRAS BATMAN GR V	1.5	D.OIL	Diesel oil	4.1	2003
2004	ECZACIBASI BAXTER HAS.URUN.	1.0	N.GAS	Natural Gas	5.8	13/01/2001
2004	CIRAGAN SARAYI ISL.	1.4	N.GAS	Natural Gas	11.0	01/11/2002
2004	ANKARA D.G.(BAYMINA) GR-I-II-III	798.0	N.GAS	Natural Gas	6500.0	08/01/2004
2004	ENTEK GR-IV	31.1	N.GAS+NAPHTA	Natural Gas	255.7	12/02/2004
2004	ATATEKS 2 GM	5.6	N.GAS	Natural Gas	45.0	20/02/2004
2004	TANRIVERDI 4 GM	4.7	N.GAS	Natural Gas	38.7	24/03/2004
2004	TEKBOY TEKSTIL 1 GM	2.2	N.GAS	Natural Gas	16.0	18/05/2004
2004	GUL ENERJI GR-II	12.5	FUEL-OIL	Fuel Oil	96.5	03/06/2004
2004	KOMBASSAN KAGIT GIDA VE TEKS	5.5	N.GAS	Natural Gas	38.1	09/06/2004
2004	AYEN OSTIM ENERJI URETIM	31.1	N.GAS	Natural Gas	264.1	11/06/2004
2004	BIS ENERJI 2 GT	73.0	N.GAS	Natural Gas	602.7	16/06/2004
2004	ENERJI-SA ADANA 1 BT	49.8	NAPHTA	Naphtha & Asphaltite	322.9	23/06/2004

[58] Regarding Build Margin calculations: the more conservative fuel type is selected

2004	SAHINLER ENERJI 1 GM	3.2	N.GAS	Natural Gas	22.2	29/06/2004
2004	BESLER GR-2, BT (5,2+7,5)	12.7	N.GAS	Natural Gas	97.7	07/07/2004
2004	CELIK ENERJI UR.STI. 2 GM	2.4	N.GAS	Natural Gas	18.6	09/07/2004
2004	KOMBASSAN KAG. MATBAA GIDA	5.5	N.GAS	Natural Gas	35.7	24/09/2004
2004	AYEN OSTIM ENERJI URETIM(BT)	9.9	N.GAS	Natural Gas	84.0	01/10/2004
2004	HABAS ALIAGA GRUP I-II	89.2	N.GAS	Natural Gas	713.9	08/10/2004
2004	STANDART PROFIL 3 GM	6.7	N.GAS	Natural Gas	49.2	22/10/2004
2004	KARKEY-II 3+3 DGM	54.3	FUEL-OIL	Fuel Oil	369.7	12/11/2004
2004	ALTINMARKA GIDA GR I-II-III	3.6	N.GAS	Natural Gas	28.8	17/12/2004
2004	ERE(BIR KAPILI HES) GRUP-I	48.5	RUN OF RIVER	Hydro	170.6	11/03/2004
2004	ELTA ELK(DODURGA) GR-I-II-III-IV	4.1	RUN OF RIVER	Hydro	12.3	26/04/2004
2004	ISKUR TEKSTIL(SULEYMANLI) GR I-II	4.6	RUN OF RIVER	Hydro	17.9	28/04/2004
2004	BEREKET EN.(Feslek Hes) Gr-1-2	9.5	RUN OF RIVER	Hydro	41.0	05/08/2004
2005	CAN GR I	160.0	LIGNITE	Lignite	1040.0	14/02/2001
2005	CAN GR II	160.0	LIGNITE	Lignite	1040.0	14/03/2001
2005	ELBISTAN-B GR I	360.0	LIGNITE	Lignite	2340.0	14/02/2001
2005	AKCA ENERJI GR-III	8.7	N.GAS+NAPHTHA	Natural Gas	65.4	13/12/2001
2005	AYKA TEKSTIL GR-I	5.5	N.GAS	Natural Gas	40.0	23/09/2001
2005	BAYDEMIRLER GR IV-V-VI	6.2	N.GAS	Natural Gas	51.4	03/02/2001
2005	BOSEN GR-III	50.0	N.GAS	Natural Gas	350.0	29/12/2001
2005	CUMRA SEKER	16.0	N.GAS+LIGNITE	Natural Gas	40.0	31/12/2000
2005	ETI MAD.(BAN.ASIT)GR-I	11.5	RENEW.+WASTES	Renewables and wastes	85.0	14/07/2001
2005	EVYAP GR I-II	5.1	N.GAS	Natural Gas	30.0	26/08/2001
2005	GRANISER GRANIT GR-I	5.5	N.GAS	Natural Gas	42.0	13/11/2001
2005	HABAS ALIAGA GR III	47.7	N.GAS	Natural Gas	381.6	01/06/2001
2005	HABAS ALIAGA GR IV	47.7	N.GAS	Natural Gas	381.6	20/09/2001
2005	HABAS ALIAGA GR-V	24.6	N.GAS	Natural Gas	196.8	23/11/2001
2005	HAYAT KAGIT GR-I	7.5	N.GAS	Natural Gas	56.0	26/05/2001
2005	ICDAS CELIK GR-I	135.0	IMPORTED COAL	Coal	1080.0	29/11/2001
2005	KAHRAMANMARAS KAGIT GR-I	6.0	IMPORTED COAL	Coal	45.0	07/12/2001
2005	KORUMA KLOR GR I-II-III	9.6	N.GAS	Natural Gas	77.0	02/12/2001
2005	KUCUKCALIK TEKSTIL GR I-II-III-IV	8.0	N.GAS	Natural Gas	64.0	26/11/2001
2005	MERCEDES BENZ TURK GR I-II-III-IV	8.3	N.GAS	Natural Gas	68.0	03/02/2001
2005	MODERN ENERJI GR-III	8.4	N.GAS	Natural Gas	62.9	13/06/2001
2005	MODERN ENERJI GR-II	6.7	N.GAS+LPG	Natural Gas	50.4	13/06/2001
2005	MOSB GR I-II-III-IV-V-VI-VII	84.8	N.GAS	Natural Gas	434.0	01.03 - 01.08.2005
2005	ORS RULMAN	12.4	N.GAS	Natural Gas	99.4	24/08/2001
2005	PAK GIDA(Kemalpasa) GR-I	5.7	N.GAS	Natural Gas	45.0	06/12/2001
2005	TEZCAN GALVANIZ GR I-II	3.7	N.GAS	Natural Gas	29.0	26/05/2001
2005	YONGAPAN(KAST.ENTG) GR-II	5.2	N.GAS	Natural Gas	32.7	24/05/2001

2005	ZEYNEP GIYIM SAN. GR-I	1.2	N.GAS	Natural Gas	9.0	06/07/2001
2005	AK ENERJI(K.pasa) GR-III	40.0	N.GAS	Natural Gas	256.9	08/11/2001
2005	AK ENERJI(K.pasa) GR I-II	87.2	N.GAS	Natural Gas	560.1	29/04/2001
2005	ALTEK ALARKO GR I-II	60.1	N.GAS	Natural Gas	420.0	13/10/2001
2005	BIS ENERJI GR VII	43.7	N.GAS	Natural Gas	360.8	17/03/2001
2005	CAN ENERJI GR-I	3.9	N.GAS	Natural Gas	28.0	24/08/2001
2005	CEBI ENERJI BT	21.0	N.GAS	Natural Gas	164.9	26/08/2001
2005	CEBI ENERJI GT	43.4	N.GAS	Natural Gas	340.1	22/08/2001
2005	ENTEK ELK.A.S.KOC UNI.GR I-II	2.3	N.GAS	Natural Gas	19.0	06/02/2001
2005	KAREGE GR IV-V	18.1	N.GAS	Natural Gas	141.9	06/04/2001
2005	KARKEY(SILOPI-4) GR-IV	6.2	F.OIL	Fuel Oil	47.2	29/06/2001
2005	KARKEY(SILOPI-4) GR-V	6.8	F.OIL	Fuel Oil	51.9	22/12/2001
2005	METEM ENERJI(Hacisiramat) GR I-II	7.8	N.GAS	Natural Gas	58.0	28/01/2001
2005	METEM ENERJI(Peliklik) GR I-II-III	11.7	N.GAS	Natural Gas	89.0	28/01/2001
2005	NOREN ENERJI GR-I	8.7	N.GAS	Natural Gas	70.0	23/08/2001
2005	NUH ENERJI-2 GR I	47.0	N.GAS	Natural Gas	319.7	23/05/2001
2005	ZORLU ENERJI KAYSERI GR-I-II-III	149.9	N.GAS	Natural Gas	1144.1	21/07/2001
2005	ZORLU ENERJI KAYSERI GR-IV	38.6	N.GAS	Natural Gas	294.9	25/10/2001
2005	ZORLU ENERJI YALOVA GR I-II	15.9	N.GAS	Natural Gas	122.0	25/11/2001
2005	TEKTUG(Kargilik) GR I-II	23.9	RUN OF RIVER	Hydro	83.0	24/04/2001
2005	ICTAS ENERJI(Yukari Mercan) GR I-II	14.2	RUN OF RIVER	Hydro	44.0	21/05/2001
2005	MURATLI GR I-II	115.0	DAM	Hydro	444.0	02/06/2001
2005	BEREKET EN.(DALAMAN) GR XIII-XIV-XV	7.5	RUN OF RIVER	Hydro	35.8	15/07/2001
2005	YAMULA GRUP I-II	100.0	DAM	Hydro	422.0	30/07/2001
2005	SUNJUT(RES) GR I-II	1.2	WIND	Geothermal & Wind	2.4	22/04/2001
2006	EKOTEN TEKSTIL GR-I	1.9	N.GAS	Natural Gas	14.0	16/02/2006
2006	ERAK GIYIM GR-I	1.4	N.GAS	Natural Gas	10.0	22/02/2006
2006	ALARKO ALTEK GR-III	21.9	N.GAS	Natural Gas	158.3	23/02/2006
2006	AYDIN ORME GR-I	7.5	N.GAS	Natural Gas	60.0	25/02/2006
2006	NUH ENERJI-2 GR II	26.1	N.GAS	Natural Gas	180.1	02/03/2006
2006	MARMARA ELEKTRIK (Corlu) GR I	8.7	N.GAS	Natural Gas	63.0	13/04/2006
2006	MARMARA PAMUK (Corlu) GR I	8.7	N.GAS	Natural Gas	63.0	13/04/2006
2006	ENTEK (Kosekoy) GR IV	47.6	N.GAS	Natural Gas	378.2	14/04/2006
2006	ELSE TEKSTIL (Corlu) GR I - II	3.2	N.GAS	Natural Gas	25.0	15/04/2006
2006	BARES IX GRUP	13.5		Geothermal & Wind	42.8	20/04/2006
2006	SONMEZ ELEKTRIK (Corlu) GR I - II	17.5	N.GAS	Natural Gas	126.0	03/05/2006
2006	MENDERES ELEKTRIK GR I	8.0	GEOTHERMAL	Geothermal & Wind	56.0	10/05/2006
2006	KASTAMONU ENTEGRE (Balikesir) GR I	7.5	N.GAS	Natural Gas	54.0	24/05/2006
2006	BARES X. ve XX. GRUPLAR	16.5		Geothermal & Wind	52.3	26/05/2006
2006	BOZ ENERJI GR I	8.7	N.GAS	Natural Gas	70.0	09/06/2006

2006	ADANA ATIK SU ARITMA TESISI	0.8	BIOGAS	Renewables and wastes	6.0	09/06/2006
2006	AMYLUM NISASTA (ADANA)	14.3	N.GAS	Natural Gas	34.0	09/06/2006
2006	SIK MAKAS (Corlu) GR I	1.6	N.GAS	Natural Gas	13.0	22/06/2006
2006	ELBISTAN B GR III	360.0	LIGNITE	Lignite	2340.0	23/06/2006
2006	ANTALYA ENERJI GR I - II - III - IV	34.9	N.GAS	Natural Gas	245.0	29/06/2006
2006	HAYAT TEM. VE SAGLIK GR I - II	15.0	N.GAS	Natural Gas	108.0	30/06/2006
2006	EKOLOJIK EN. (Kemerburgaz) GR I	1.0	LANDFILL GAS	Renewables and wastes	6.0	31/07/2006
2006	EROGLU GIYIM (Corlu) GR I	1.2	N.GAS	Natural Gas	9.0	01/08/2006
2006	CAM IS ELEKTRIK (Mersin) GR I	126.1	N.GAS	Natural Gas	1008.0	13/09/2006
2006	ELBISTAN B GR II	360.0	LIGNITE	Lignite	2340.0	17/09/2006
2006	YILDIZ ENT. AGAC (Kocaeli) GR I	6.2	N.GAS	Natural Gas	40.0	21/09/2006
2006	CERKEZKOY ENERJI GR I	49.2	N.GAS	Natural Gas	390.0	06/10/2006
2006	ENTEK (Kosekoy) GR V	37.0	N.GAS	Natural Gas	293.9	03/11/2006
2006	ITC-KA EN. MAMAK TOP.M. GR I-II-III	4.2	LANDFILL GAS	Renewables and wastes	30.0	03/11/2006
2006	ELBISTAN B GR IV	360.0	LIGNITE	Lignite	2340.0	13/11/2006
2006	MARE MANASTIR RUZGAR (X GRUP)	8.0		Geothermal & Wind	12.0	08/12/2006
2006	CIRAGAN SARAYI GR I	1.3	N.GAS	Natural Gas	11.0	01/12/2006
2006	ERTURK ELEKTRIK Tepe RES GR I	0.9	WIND	Geothermal & Wind	2.0	22/12/2006
2006	AKMAYA (Luleburgaz) GR I	6.9	N.GAS	Natural Gas	50.0	23/12/2006
2006	BURGAZ (Luleburgaz) GR I	6.9	N.GAS	Natural Gas	54.0	23/12/2006
2006	SEYHAN I-II	0.3	HYDRO	Hydro	1.7	20/02/2006
2006	SANLIURFA GR I-II	51.8	HYDRO	Hydro	124.0	01/03/2006
2006	BEREKET ENERJI GOKYAR HES 3 Grup	11.6	HYDRO	Hydro	43.3	05/05/2006
2006	MOLU EN. Zamanti Bahcelik GR I - II	4.2	HYDRO	Hydro	16.7	31/05/2006
2006	SU ENERJI (Balikesir) GR I - II	4.6	HYDRO	Hydro	20.7	27/06/2006
2006	BEREKET EN.(Mentas Reg) GR I - II	26.6	HYDRO	Hydro	108.7	31/07/2006
2006	EKIN (Basaran Hes) (Nazilli)	0.6	HYDRO	Hydro	4.5	11/08/2006
2006	ERE(Sugozu rg. Kizilduz hes) GR I - II	15.4	HYDRO	Hydro	31.6	08/09/2006
2006	ERE(AKSU REG.ve SAHMALLAR HES) GR I-II	14.0	HYDRO	Hydro	26.7	16/11/2006
2006	TEKTUG(Kalealti) GR I - II	15.0	HYDRO	Hydro	52.0	30/11/2006
2006	BEREKET EN.(Mentas Reg) GR III	13.3	HYDRO	Hydro	54.4	13/12/2006
Total		**5,791.8**			**38,691.9**	

Table 33. Electricity Generation of Selected Recent Capacity Additions by Fuel Type

Capacity Additions by Fuel Type	**Average Generation, GWh**				
	2003	**2004**	**2005**	**2006**	**Total**
Coal	0.0	0.0	1125.0	0.0	1125.0
Lignite	0.0	0.0	4420.0	7020.0	11440.0
Fuel Oil	1934.6	466.2	99.1	0.0	2499.9
Diesel oil	0.0	4.1	0.0	0.0	4.1
LPG	0.0	0.0	0.0	0.0	0.0
Naphtha & Aphaltite	0.0	322.9	0.0	0.0	322.9
Natural Gas	1487.8	8827.2	6995.4	3457.4	20767.8
Renewables and wastes	0.0	0.0	85.0	42.0	127.0
Hydro	483.0	241.8	1028.8	484.3	2237.9
Geothermal & Wind	0.0	0.0	2.4	165.0	167.4
Total	**3,905.3**	**9,862.2**	**13,755.7**	**11,168.7**	**38,691.9**

ANNEX II

RELEVANT DOCUMENTS

EPDK

T.C.
ENERJİ PİYASASI DÜZENLEME
KURUMU

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi
Yenilenebilir Enerji Kaynağı Kullanmaktadır.

Lisans No : EÜ/133-25/172

Tarih : 24/04/2003

Bu Lisans, **Tektuğ Elektrik Üretim Anonim Şirketi**'ne (28/07/2005 tarihli ve 528-14 sayılı Kurul Kararı ile Tektuğ Elektrik Enerjisi Üretim Anonim Şirketi olan ünvanı değiştirilmiştir), Kahramanmaraş İli, Andırın İlçesi sınırları içerisinde kurulacak **Kargılık Hidroelektrik Santralı** üretim tesisinde 24/04/2003 tarihinden itibaren 40 yıl süreyle (11/09/2003 tarihli ve 207-13 sayılı Kurul Kararı ile 20 yıl olan lisans süresi değiştirilmiştir), üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 24/04/2003 tarihli ve 133-25 sayılı Kararı ile verilmiştir.

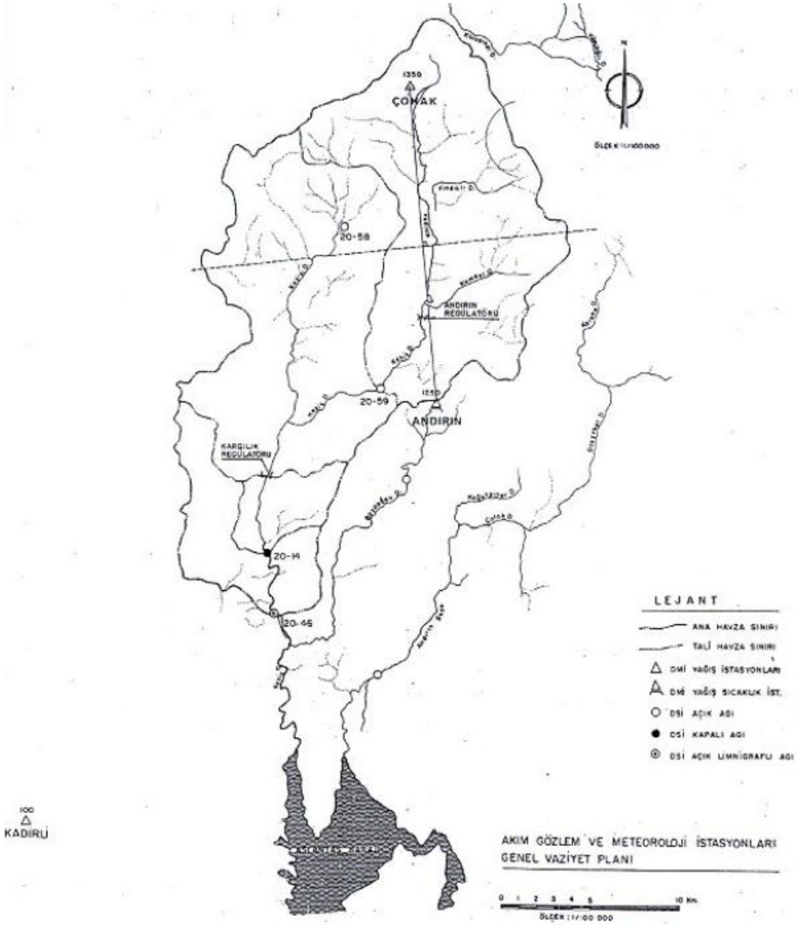
Yusuf GÜNAY
Başkan

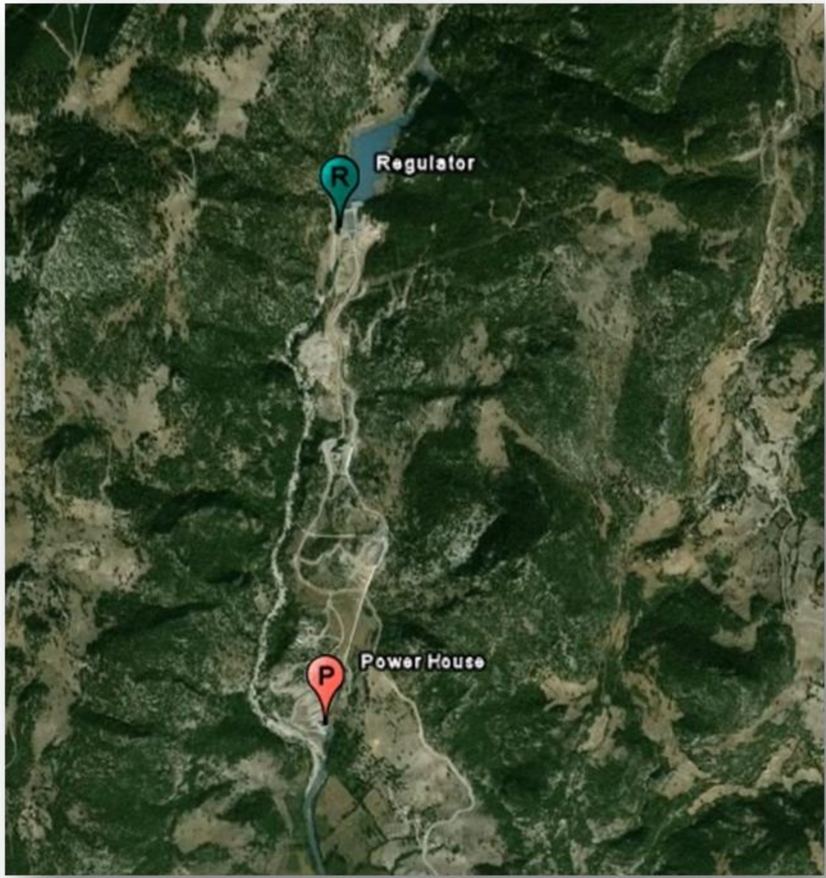
Bu lisans, genel ve özel hükümleri ile ayrılmaz bir bütündür.

Figure 8. Generation License

ANNEX III

PROJECT LOCATION





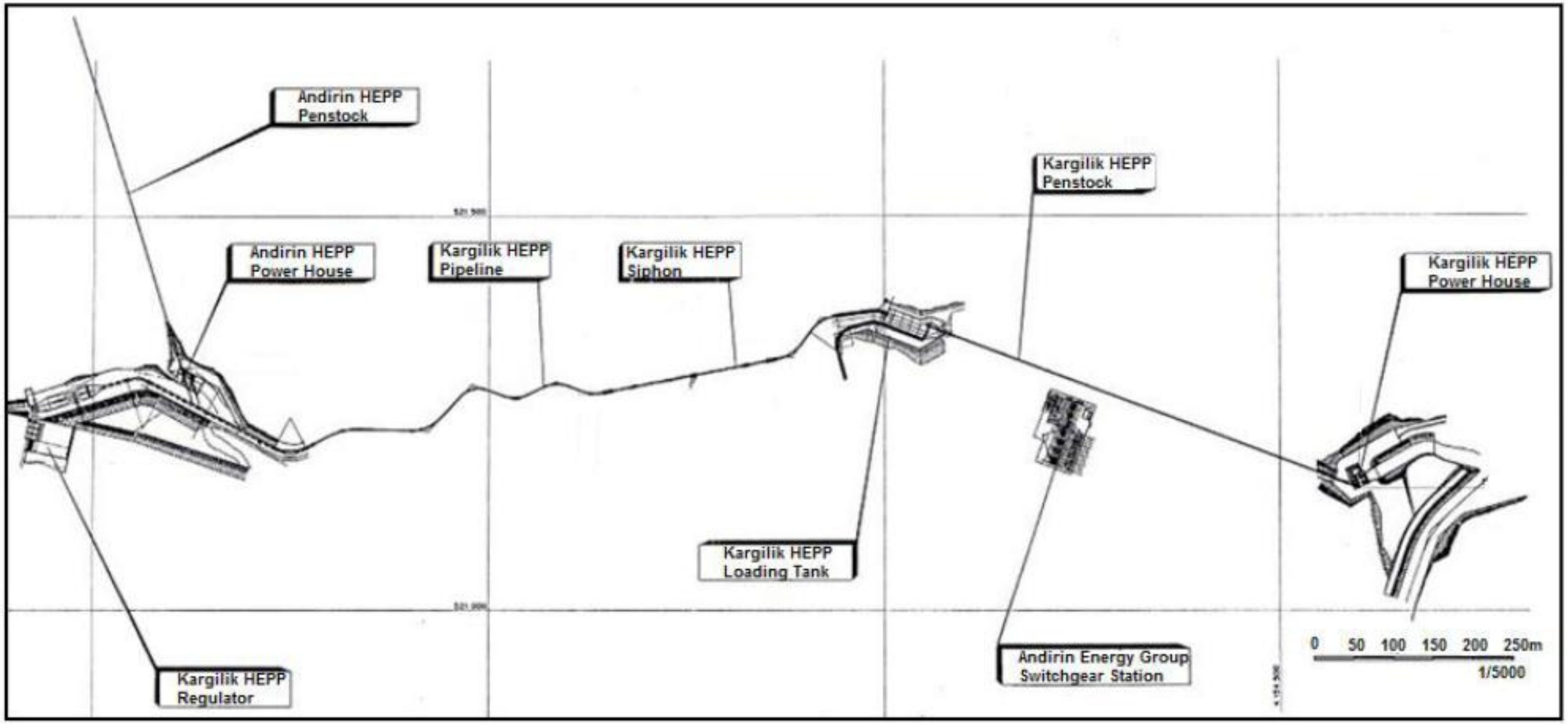


Figure 9. Geographical layout of the project location

10 Pictures

Figure 10. Regulator

Figure 11. Regulator

Figure 12. Power House and Switchgear Station

Figure 13. Power House Interior