EGLENCE I-II HYDROELECTRIC POWER PLANT

Document Prepared By Gaia Carbon Finance

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Egenda Ege Enerji Uretim A.S. plans to install a hydro power plant in Adana, Turkey. The objective of the Eglence I-II Hydroelectric Power Plant (Eglence I-II HEPP) is to generate electricity and supply it into the public grid. It shall be registered as a VCS project in order to facilitate the project implementation by means of financial inflows coming from the credits sale. Due to its significant contribution to climate change mitigation and sustainable development in the region, this project is expected to fulfil the requirements of VCS rigorously.

Eglence I-II, a run-off-river hydroelectric power plant, is located on the Eglence River, in the Mediterranean Region within the Karaisali disrict of Adana province. Eğlence I-II consists of construction of a green field project with 68.65 MWe of installed capacity comprising two weirs and two power houses. (The units proposed to be established upstream are named as “Eglence-I” while the units proposed to be established downstream are named as “Eglence-II”. Therefore; these mentioned supplementary projects are observed as a whole named “Eglence I-II”) A regulator at a talweg elevation of 693.0 meters within the borders of Yenikoy district is planned. The rising water will first be taken to a sedimentation pool followed by a two-peace conveyance tunnel. There will be a conduit between them. With the aid of a shaft, water will be transferred to the Eglence I power house. The tail water coming out of Eglence I power station will be transferred to the conveyance tunnel. after which water will be first transferred to a head pond and a penstock. Finally, water will be transported to the Eglence II power house, planned to be found on the right bank of the river. Each power house will be comprised of three turbines.[1] The installed capacity of Eglence I will be 42.65 MWe, generating approximately 127,280 MWh of clean energy per annum[2], while the installed capacity of Eglence II will be 26.00 MWe, generating approximately 78,019 MWh of clean energy per annum[3]. (Net of internal usage)

The purpose of this document is to assert that the implementation of the proposed project faces financial risks that are hard to overcome without carbon financing. Other than financial impediments, according to the EIA Reports, there not any serious risks that may substantially affect the project’s GHG emission reductions. Graphics in the reports which display the regularity of water discharge over the year may be accounted for references regarding water flow forecast.

The main purpose of the project is to generate approximately 205,299 kWh/year of electricity to supply the national grid using a renewable resource and tapping the significant hydropower potential in the region. In order to implement a renewable energy project, it will be made sure that environmentally safe and sound technology will be used and necessary trainings to the workers will be provided for the transfer of know-how. The project activity reduces greenhouse gases (GHGs) emissions that would have otherwise occurred in the absence of the project activity because electricity generation from fossil fuel sources is avoided. The average annual emission reduction of the proposed Project is estimated to be 114,065 tonnes of CO_2e (tCO_2e).

1.2 Sectoral Scope and Project Type

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

The approved baseline and monitoring methodology ACM0002-Version 13 0.0: *“Consolidated baseline methodology for grid-connected electricity generation from renewable sources”* (“*ACM0002*”) is applied.

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

[1] EĞLENCE I-II VE HES PROJESİ REVİZE FİZİBİLİTE RAPORU Mayıs 2011-Bölüm-1
[2] Eğlence I HES LİSANS_2013tadil.pdf
[3] Eğlence II HES LİSANS_2013tadil.pdf

Sectoral Scope: Energy Industries -Renewable Energy

The project is not a grouped project.

1.3 Project Proponent

The project developer:
In accordance with the Electric Market Law No. 4628, Egenda Ege Enerji Uretim A.S. was founded to construct, commission, operate and transfer a hydroelectric power plant in order to generate and market electric power.

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

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

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

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

Organization:	Egenda Ege Enerji Uretim A.S.
Street/P.O.Box:	1380 Sok. No.2/1 Alyans Apt. 3/5
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State/Region:	
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URL:	http://www.gaiacf.com
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Middle Name:	
First Name:	Gurkan
Department:	
Mobile:	
Direct FAX:	+90 212 224 04 66
Direct tel:	+90 212 224 04 50
Personal E-Mail:	gbayraktar@gaiacf.com

Gaia Carbon Finance whose contact details are given above is a project participant. Gaia is responsible for developing baseline and additionality, and also managing the carbon crediting process.

1.4 Other Entities Involved in the Project

1.5 Project Start Date

- Project start date: 10th April 2013 (The commissioning date of the Eğlence-II HEPP)VCS crediting period start date: 10th April 2013.
  VCS project crediting period: 10 years, renewable once.

1.6 Project Crediting Period

The crediting period of the project begins with the commissioning of the plant. The exact commencement date for the plant is the day of first documented supply to the grid with entire capacity. The expected annual electricity output and the estimated emission reductions along the first ten years of crediting are given in the next section. The anticipated date for the project to supply electricity to the grid is 10th April t, 2013. The project crediting period is 10 years and renewable once. Therefore, the first crediting period starts on 10th April 2013 and ends on 10th April 2023.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

The subject project is not a grouped project. According to domestic regulations, with an installed capacity of 68.65 MWe, the Eglence I-II HEPP is qualified as a large-scale project. The project comes under Type I – Renewable Energy Project as per Appendix B of the procedures for CDM project activities. The project is a 68.65 MWe HEPP and uses renewable sources to produce electricity. Since the installed capacity of the planned HEPP larger than 15 MW; it is a large scale renewable energy project activity according to the Decision 17/ CP.7 Article 6.

The expected annual emission reduction is 114,065 tonnes as stated in Table 1 According to the VCS 2007:1 Guideline section 5; the project falls into the individual validation and verification of a GHG programme option and the project size is ‘’project’’ since the expected annual emission reduction is less than 1,000,000 tonnes and more than 5,000 tonnes.

Project	X
Large project	

Years	Estimated GHG emission reductions or removals (tCO2e)
April 10th, 2013[4]	70,415
2014	114,065
2015	114,065
2016	114,065
2017	114,065
2018	114,065
2019	114,065
2020	114,065
2021	114,065
2022	114,065
April 10th, 2023	30,938
Total Estimated ERs	**1,127,938**
Total number of crediting years	10
Average annual ERs	114,065

Table 1: Estimated amount of VERs over the crediting period.

1.8 Description of the Project Activity

PROJECT TECHNOLOGIES		
	Eglence I	Eglence II
Regulator		
Type	concrete	concrete
Talweg elevation(m)	693	404
Crest elevation(m)	695,5	413,45

[4]Commissioning dates of Eğlence-I and Eğlence-II are different. Eğlence-II is commissioned at 10.04.2013 and after the 2 months Eğlence-I is started to generation (13.06.2013). Therefore, sum of 2013 and 2023 emission reductions are different from the average annual ERs.

Conveyance Tunnel		
Diameter(m)	3,4	3,4
Length(m)	5398,50	1918,24
Capacity(m3/s)	17,4	17,4
Penstock		
Type	steel	steel
Diameter(m)	2,4	2,4
Length(m)	1146	700
Capacity(m3/s)	17,4	17,4
Power house		
Type	on the ground	on the ground
tailwater elevation(m)	410	235

Table 2: Project technologies[5]

The project was designed by EN-SU Muhendislik Musavirlik Ltd.. Sti. which has significant experience in the field of hydropower plant design.[6] Within the scope of the project, all precautions have been taken for the environment during the design phase and the project will be implemented in line with the environmental law and related regulations.

The technology used in the plant includes first hand hydro turbines and its auxiliary equipments with extensive automatization. The project does not need extensive initial training and maintenance efforts in order to work as presumed during the project period. Necessary trainings to the plant staff will be delivered by the supplier in line with the agreement between the project owner and the supplier.

Expected Level of Activity:

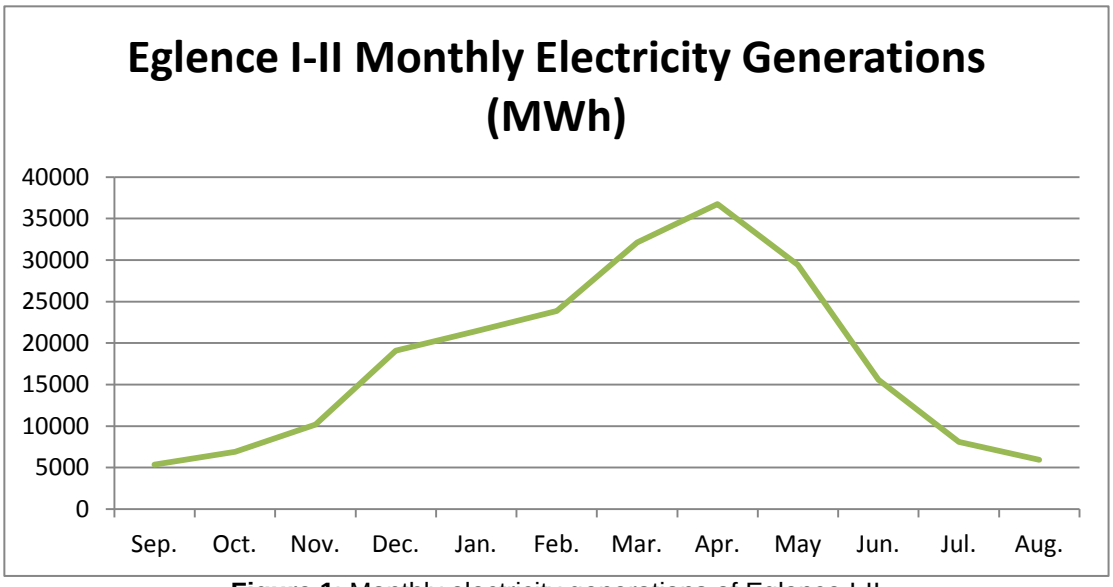


Figure 1: Monthly electricity generations of Eglence I-II

(MWh)	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
Eglence I-II	5347	6914	10159	19094	21440	23875	32123	36763	29409	15594	8102	5920

[5] EĞLENCE I-II VE HES PROJESİ REVİZE FİZİBİLİTE RAPORU Mayıs 2011-Bölüm-1-pg(1-10)
[6] http://www.ensu.com.tr/referanslar.php?ID=1

Table 3: Monthly electricity generations of Eglence I-II

1.9 Project Location

Turkey is the host country. Turkey has ratified the Kyoto Protocol on February 5, 2009. Yet, in practice, Turkey will not commit to a cap on its greenhouse gas emissions and will not be a host for Clean Development Mechanism (CDM) or Joint Implementation (JI) projects because of its particular situation (Please see the final report of COP-7, Marrakesh)[7]. However as an Annex I party to the UNFCCC, Turkey is required to develop, and submit to the UNFCCC Secretariat, annual inventories on emissions and removals of greenhouse gases, not controlled by the Montreal Protocol, using the Intergovernmental Panel on Climate Change (IPCC) methodology and IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories. Turkey published a framework regulation for monitoring, reporting, and verification (MRV) of facilities from industry and energy sectors in April 2012. The regulation is based on the EU-ETS MRV regulation. Installations with a capacity over a certain limit will be required to submit their GHG emissions by 2016. The first monitoring year of compliance is 2015, and obligated entities need to prepare their monitoring plans and submit them to MoEU by June 2014.[8] Turkish National Focal Point to the UNFCCC is the Ministry of Environment and Urbanism.

The Project sites are located in Turkey, in the Mediterranean Region, Adana province, in the boundaries of Aladağ and Karaisali districts The Eglence I-II is between 37° 41'28" and 37° 38'12" north latitudes and 35° 21'09" and 35° 20'11" east longitudes.

The following figures show the project's location and layout:

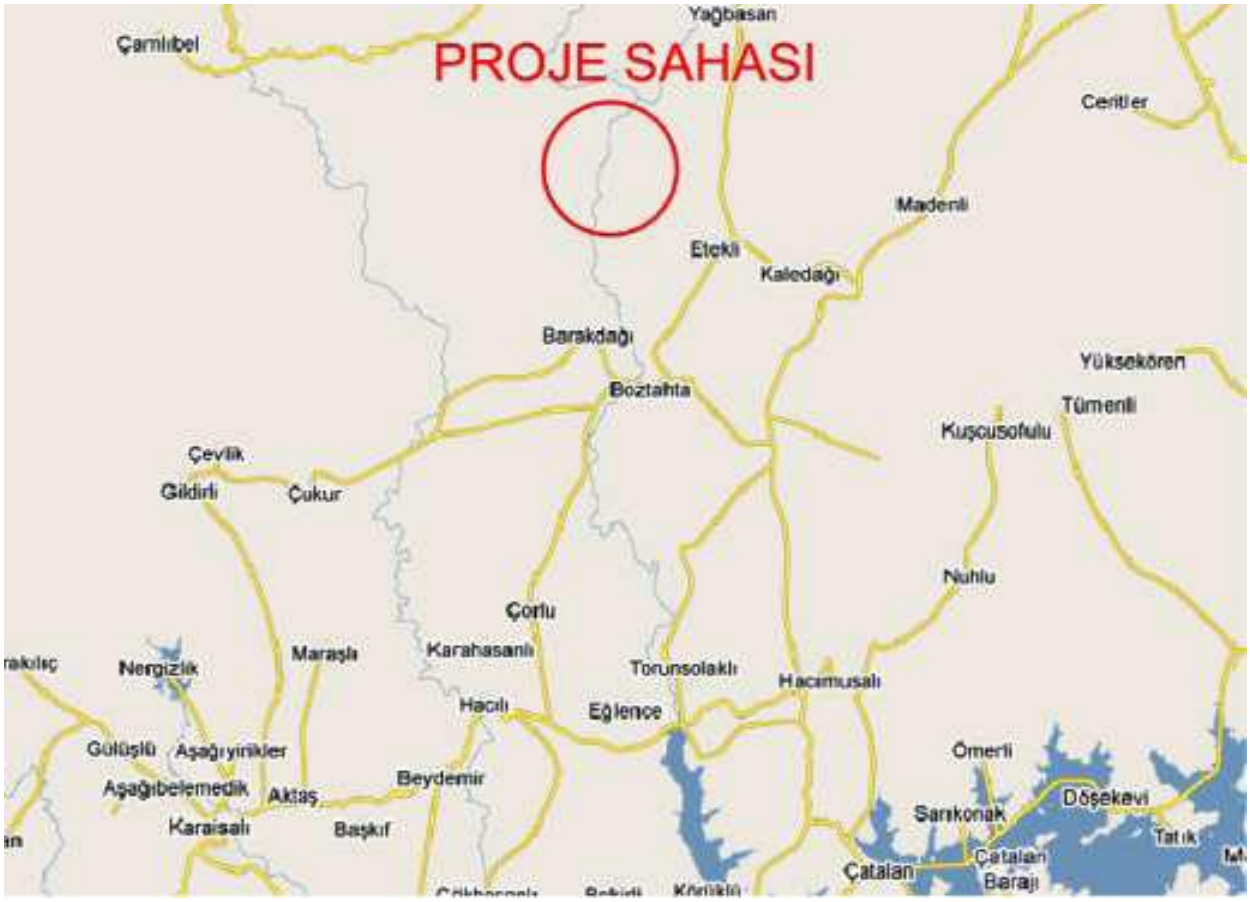
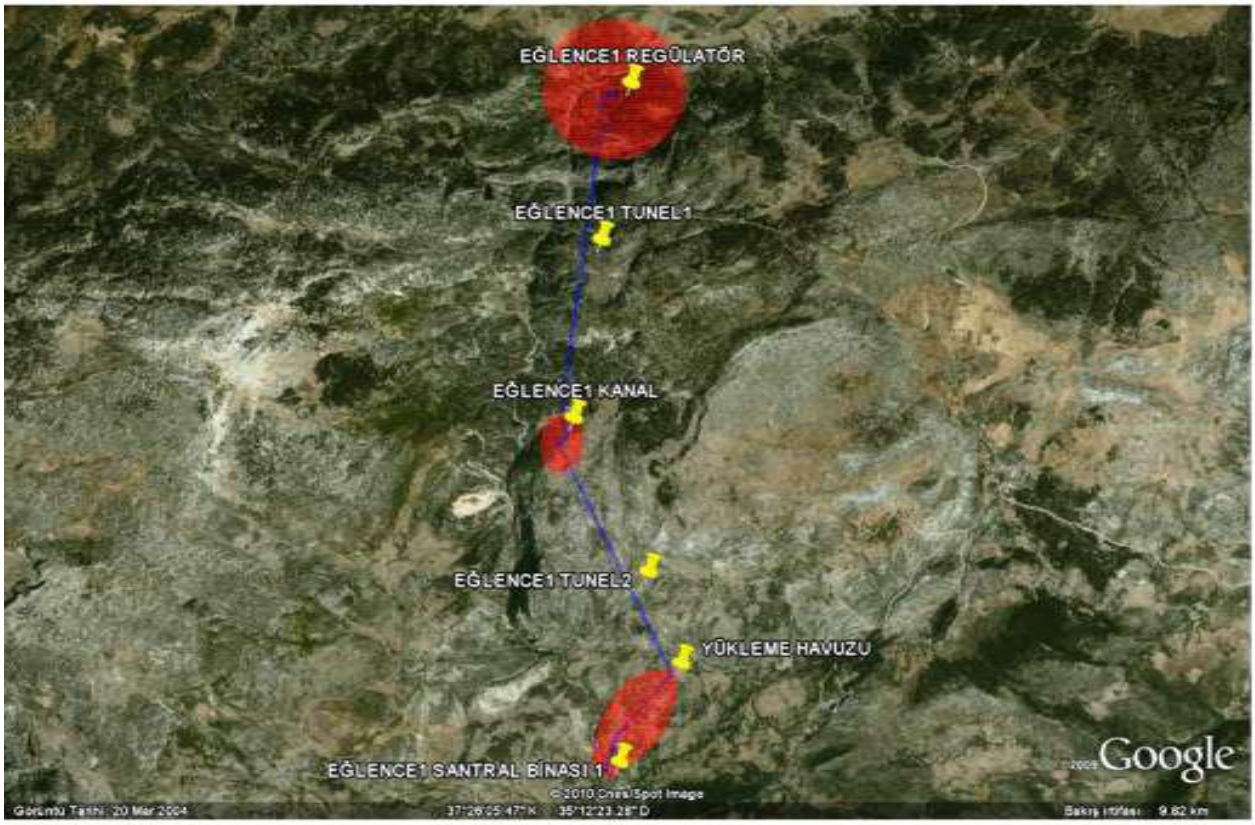


Figure 2: The project's location

[7] http://ec.europa.eu/environment/climat/pdf/marrakech_report.pdf
[8] https://www.thepmr.org/system/files/documents/TUR-FINAL-MRP_2013-05-03%20Final.pdf page-7



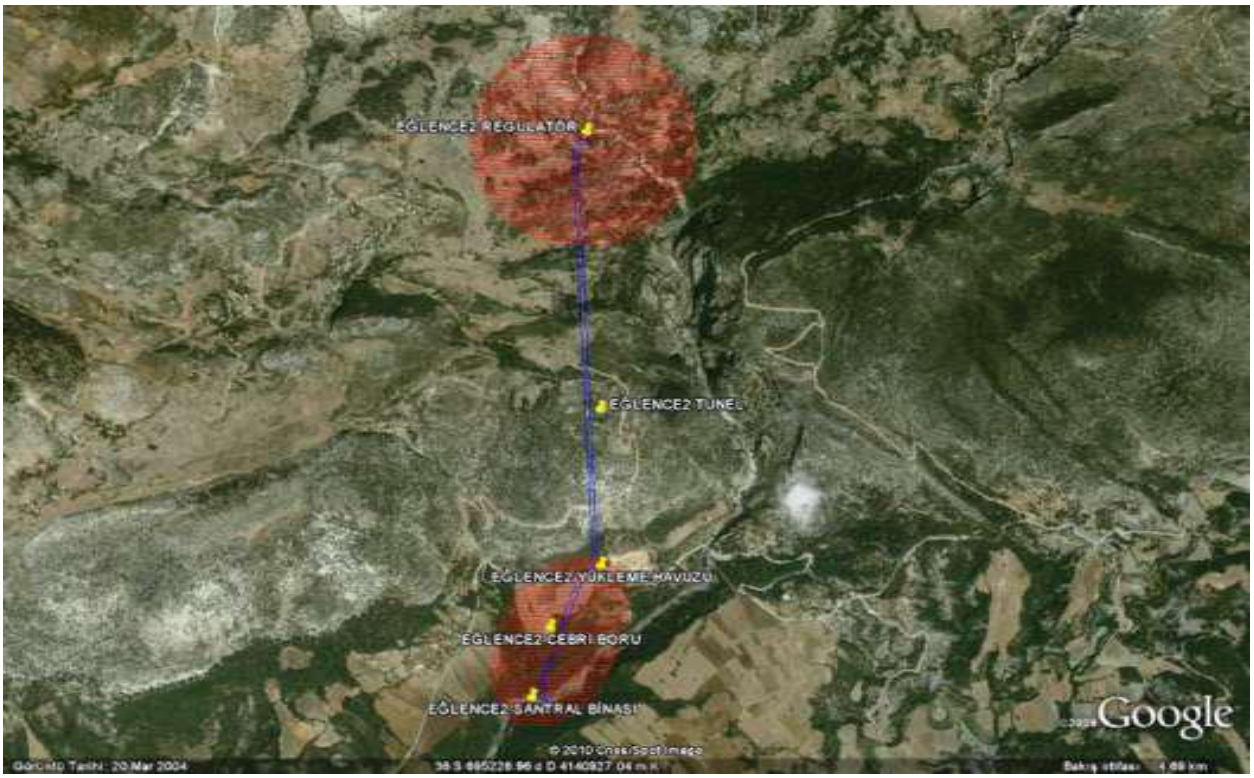


Figure 3: Project layout

1.10 Conditions Prior to Project Initiation

Before the implementation of the project, it has been found out that there was a very small area of maquis typed forest land. The rest of the land was mentioned to be uncultivated area. With regard to the maquis typed land, an approved development plan was prepared for determination of the land

reserved for the transformer station and the power house and the mentioned development plan was approved by the Adana Provincial Special Administration [9] in line with the Forest Law (17th Act of No: 6831; "The Regulation about The Permissions Granted to Forest Land"

As the project activity is a Greenfield project, the conditions prior to the project initiation is the continuation of the current situation, i.e. the equivalent amount of energy would have been produced by other grid-connected units, which are mainly thermal power plants, undertaking business as usual maintenance. Since the proposed project whose characteristics are summarized above, aims at generating emission free energy through hydropower; thus, will result in emission reduction in parallel with its electricity generation figures. Moreover, the project is not implemented to generate GHG emissions for the purpose of its subsequent reduction. The CH_4 emission will be counted as negligible since the power density of the project is far above $10W/m^2$.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

It is important to note that there are no local laws and regulations in Turkey because it is not a federal state. The Eglence I-II HEPP is in compliance with relevant national laws and regulations related to the project.
The applicable mandatory laws that will be applied for the project are:

i. *Electricity Market Law*[10]: It was enacted in March 3, 2001. The Law aims to ensure the development of a financially sound and transparent electricity market operating in a competitive environment under the provisions of the civil law. It also underlines the needs to produce a sufficient, high quality, low cost and environmentally friendly electricity to consumers. The text also provides guidelines to structure the autonomous regulation and the supervision of the market.

ii. *The Renewable Energy Law*[11]: It compels electricity selling companies to purchase from "Green" energy providers until 2011 at a defined ratio and at a defined price. This ratio is based on previous year sales over total energy sold in the country. The price is based on a yearly average wholesale purchase price predetermined by the Energy Market Regulatory Authority (EMRA).

iii. *Environmental Law*[12]: The law that came into force in 1983, considering the environment as a single domain aims not only to prevent and eliminate environmental pollution, but also to allow the management of land and natural resources with an integrated manner. According to its basic principles, as stated also in the Constitution, citizens as well as the State bear responsibility for the protection of the environment. It is also stated in the Law that in all economic activities every measure should be taken to minimize pollution.[13]

iv. Regulation on procedures and principles of signing the agreement of water resources utilization to generate electricity for the electricity market[14].

The project complies with all aforementioned laws as its activity aims at generating electricity by using a renewable resource: hydroelectric power; in a sufficient, low-cost and environmentally-friendly manner, using the latest technology available on the market. Moreover, an Environmental Impact Assessment (EIA) has been carried out and the results of this study concluded that the project activity has no significant impact on the environment. (Please refer to Section **Hata! Başvuru kaynağı bulunamadı.** for detailed information).

Furthermore, according to the letter from the Adana Regional Forestry Directorate Forest Operation Management, dated back February 1st 2010,[15], valued in the scope of Soil Protection and Land Use

[9] Please see the EIA Reports p.10.
[10] Law Number: 4628 Ratification Date: 20.02.2001 Enactment Date: 03.03.2001
[11] Law Number: 5346 Ratification Date: 10.05.2005 Enactment Date: 18.05.2005
[12] Law Number: 2827 Ratification Date: 09.08.1983 Enactment Date: 11.08.1983
[13] "Turkey's Environment: a review and evaluation of Turkey's environment and its stakeholders", May 2002. http://www.rec.org/REC/Programs/ExtensionToTurkey/TurkeysEnvironment.pdf
[14] Official Gazette: #25150, on 26.6.2003
[15] Letter numbered B.18.1.OGM.1.23.Ş3.231-2753.

Law No: 5403, the project activity will supply added values and employment, and considering the EIA regulation, the facilities' construction will have no negative impact on the forest and its vicinities.

In addition, in the official letter from Ministry of Culture and Tourism, Adana Regional Council of Protection of Cultural and Natural Assets, dated November 6th 2009[16], it was declared that there are not any cultural or historical assets in the Project site as defined within the scope of the Laws No: 2863.

1.12 Ownership and Other Programs

1.12.1 Right of Use

Please see Annex 1 for licence.

1.12.2 Emissions Trading Programs and Other Binding Limits

GHG emission reductions or removals generated by the project will not be used for compliance with an emissions program or to meet binding limits on GHG emissions.

1.12.3 Participation under Other GHG Programs

The project has not been registered or is seeking registration under any other GHG Programs.

1.12.4 Other Forms of Environmental Credit

There is no other form of environmental credit generated by the project because there is no such system within the country. The projects originate from Turkey do not comply for renewable energy certificates of EU because there is no energy trade between EU and Turkey because of different grid structures.

1.12.5 Projects Rejected by Other GHG Programs

The project was not rejected by any other GHG programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

This is not a grouped project.

Leakage Management

As suggested in ACM0002 / Version 13.0.0, the leakage emissions are not calculated and accepted as "0".

Commercially Sensitive Information

There is no commercially sensitive information.

Further Information

The concept of hydropower projects undertaken by private sector is a very immature concept in the country. In this sense, the project will help Turkey to stimulate the commercial application of grid connected renewable energy technologies and markets. It will also be a crucial sample of establishing the feasibility of larger grid connected small to medium scale runoff-river HEPPs as a tool to support

[16] Letter numbered 254.

energy security, improved air quality, alternative sustainable energy, improved local source of income and sustainable renewable energy industry development. The specific benefits of the project are:

The project contributes to sustainable development in Turkey and around the region in two major ways:

- Hydropower presents significant environmental benefits:
  - Generating electricity from hydropower energy does not result in emissions of pollutants into the atmosphere with zero residuals that carry adverse impacts on soil, water etc. Regular emissions from conventional electricity generation such as sulphur dioxide, nitrogen oxide and particulates will not occur in this case.
  - As a renewable energy source hydropower can be used without jeopardizing the supply of primary energy sources in the future.
  - The proposed project will significantly contribute to the reduction of GHGs, thereby reducing the effects of global climate change in the medium and long term.
- Hydropower presents significant economic and social benefits:
  - Agriculture is one of main livelihoods in the region. Emission of pollutants such as sulphur dioxide through shifting to fossil fuel based electricity generation in the region to satisfy energy need of the region will result in damaging the quality of agriculture cause economic harm in the region. However, Eglence I-II HEPP will not result in any GHG emissions and will not result in pollutions that damages the agricultural activities in the region.
  - Construction of Eglence I-II HEPP and operation of the plant will result in extra employment provides many contributions in kind in the local area. During the construction of the project 240 workers have been employed periodically from the region and after the plant is commenced, 14 people are being planned to work for the operation of the plant constantly.
  - The local people will use the roads opened by the company for the construction of the project.
  - The company will contribute to the local people to provide potable water to their villages.
  - Construction supplies will be acquired from the region as much as possible.

There is no public funding available for the project.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The baseline for the project was established through the official methodology of ACM0002 / Version 13.0.0., named "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"[17] as approved by the CDM Executive Board. Also, to prove additionality and to calculate the grid emission factor, the official methodologies: "Tool for the demonstration and assessment of additionality, Version 06.01.0."[18] and "Tool to calculate the emission factor for an electricity system, Version 02.01.0"[19] are used. Last, the consolidated monitoring methodology for grid connected generation from renewable sources named as "Approved Monitoring Methodology ACM0002 / Version 13 0.0. is applied in order to define the monitoring plan

[17] https://cdm.unfccc.int/filestorage/D/Y/P/DYPFI935XBG274NWH6O8CM1KEZR0VU/EB67_repan13_ACM0002_ver13.0.0.pdf?t=WGJ8bW5oeTZqfDA8Ng8FGePmaz63nbZZzhkX

[18] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf

[19] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

2.2 Applicability of Methodology

The project emissions, baseline emissions and emission reductions are calculated as demonstrated in the methodologies:

In order to calculate the emission reductions resulting from the project, first, the baseline emissions are calculated in "6 Steps" as suggested in the "Tool to calculate the emission factor for an electricity system, Version 02.01.0" In the first step, the relevant electricity system is defined. In the second step, Option I is chosen, which includes only the grid connected power plants. In the third step, the "Simple OM Method" is selected and in the fourth step the OM Emission factor value is calculated according to the formula (7) of the selected method. When it comes to the Step 5, the power units which are included to the BM Emission Factor calculations are defined as the " 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." In the fifth step, the BM value is calculated with the formula 13. And last, in Step 6, the combined margin emission factor is calculated as the average of the OM and BM emission factor values (formula 14). Before calculating the BM value, the EFEL values are calculated for each type of power plant according to the fuel used in these plants. To calculate the EFEL values, the fuel specific emission factors (tCO2/TJ) are converted to "tCO2/MWh" first. And then, these values are multiplied with the default plant efficiency rates given under Annex I of the tool. (The detail of BM Calculation can be found in Section 2.4. and Annex 3)

On the other hand, the project emissions are calculated according to the formula (1) in ACM0002 / Version 13 0.0. In order to calculate the project emissions from the reservoir, first, the power density of the project is calculated by using the formula (5) in the tool. Since the power density of the project is greater than 10 W/m2, project emissions from reservoir ($PE_{HP,y}$) is accepted as "0", as it is indicated in the formula (4) of the tool. Also, as suggested in ACM0002 / Version 13 0.0, the leakage emissions are not calculated and accepted as "0". Last, baseline emissions are calculated by multiplying annual electricity generation of the project with the grid emission factor (formula 6), as suggested by ACM0002 / Version 13 0.0. Last, the emission reductions are calculated by deducting project emissions from baseline emissions (formula 11 in ACM0002/Version 13 0.0). Since there are no project emissions in this project, emission reductions are equal to baseline emissions.

The choice of methodology ACM0002 / Version 13 0.0 is justified as the proposed project activity meets relevant applicability criteria:

- Eglence I-II HEPP Project is a grid connected renewable power generation project which adds electricity capacity from hydro power sources and which supplies electricity to a system that is supplied by at least one fossil fuel fired generating unit,
- The project activity results in a very small reservoir to balance the water flow to the power house (before the diversion weir). In addition, the power density of the power plant, as per definitions given in the Project Emissions section of ACM0002 / Version 13 0.0, is much greater than 4 W/m^2 as calculated in section 1.3 "Estimated amount of emission reductions over the crediting period including project size" of this PDD,
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available as "Description of how the baseline scenario is identified and description of the identified baseline scenario" of this PDD,
- The project does not involve switching from fossil fuels to renewable energy at the site of the project activity,
- The project involves construction of new units in a brand new plant, in other words the project does neither involve the addition of renewable energy generation units at an existing renewable power generation facility nor does it foresee to retrofit or modify an expired facility of renewable energy generation.

2.3 Project Boundary

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the national electricity grid. See Figures 4-5 below regarding the project boundary:

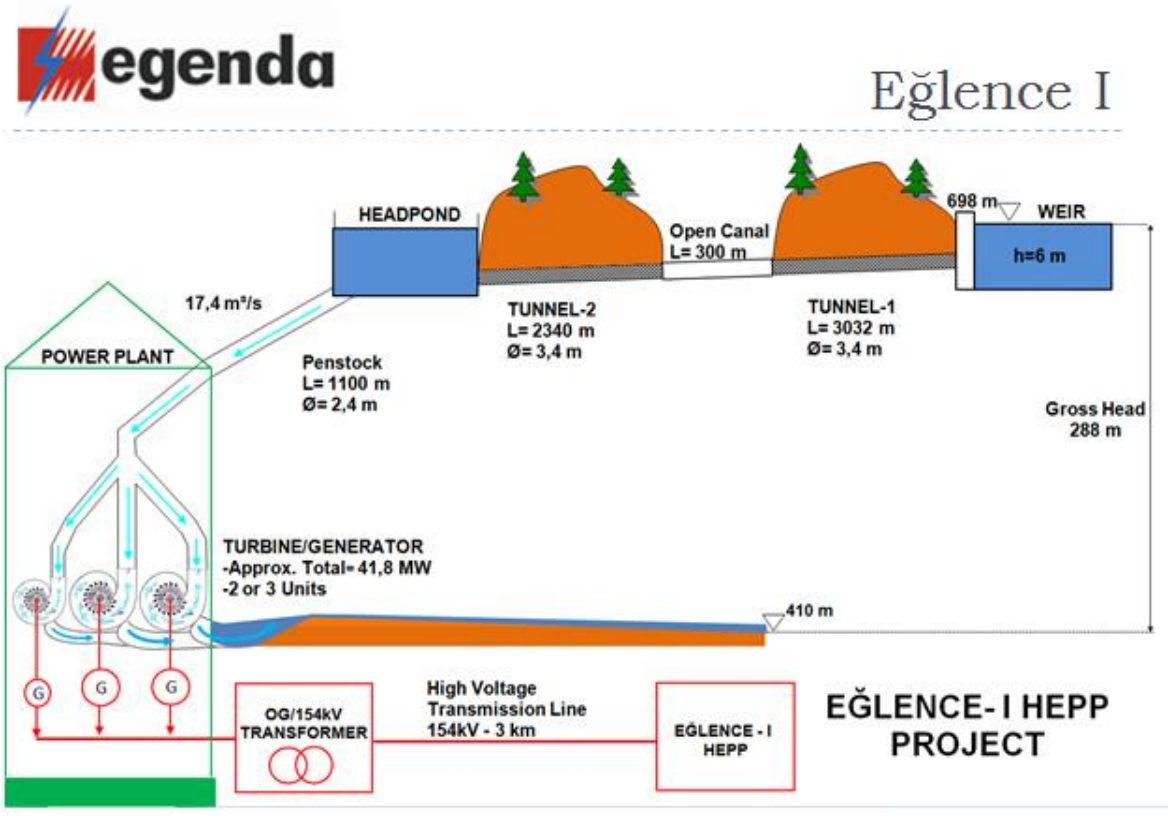


Figure 4: Project Boundary of Eğlence-I HEPP

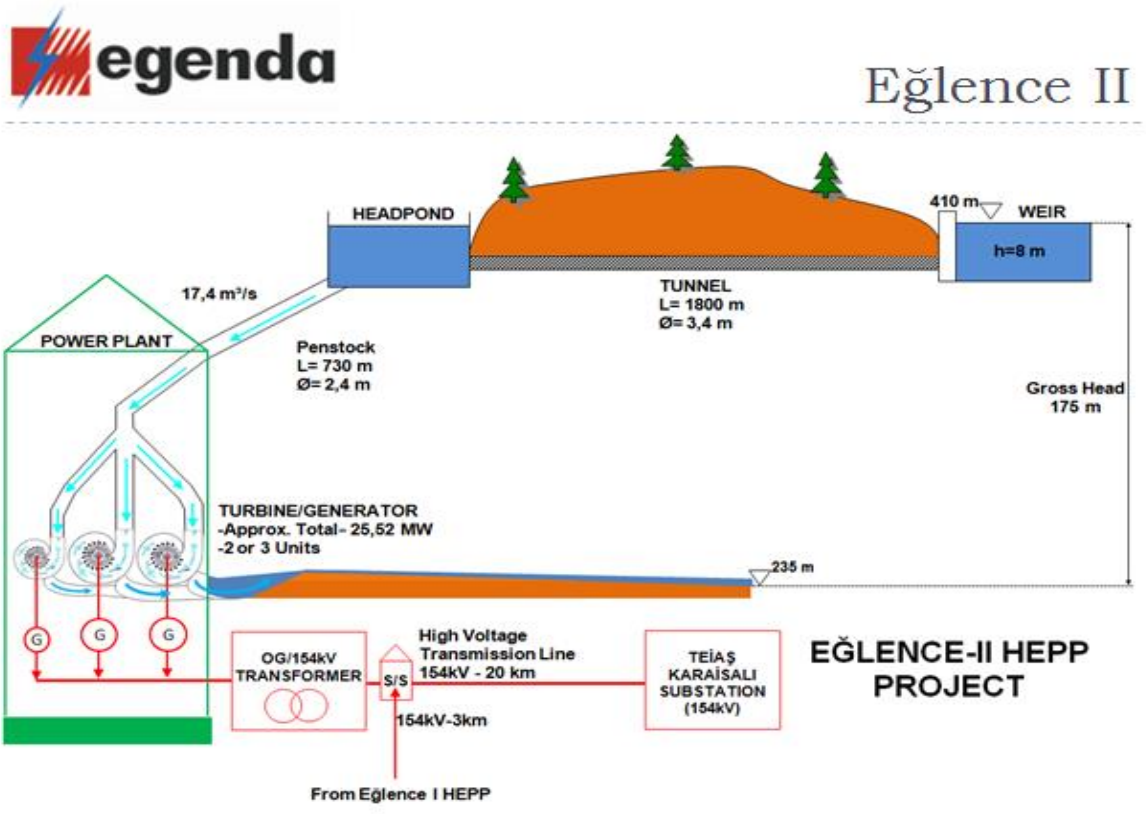


Figure 5: Project Boundary of Eğlence-II HEPP

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

	Source	Gas	Included?	Justification
Baseline	Generation mix of electricity grid in Turkey	CO_2	Yes	CO_2 emission from fossil fuel fired power plant that are displaced due to project activity was taken into account.
		CH_4	No	Minor emission sources as suggested by ACM0002, Version 13 0.0.
		N2O	No	
Project Activity	Construction and Operation of the project activity	CO_2	No	As net electricity approach is adopted, emissons that occur during construction and during the operation are negligible and non-existent respectively.
		N2O	No	Minor emission source as suggested by ACM0002, Version 13 0.0.
		CH_4	No	Minor emission source as suggested by ACM0002, Version 13 0.0. Emissions that occur during the construction are negligible.

Table 4: The justification for project boundary

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

For the purpose of determining the electricity emission factor, the project electricity system is defined as the overall Turkish electricity network. There is an interconnected system for the electric distribution in Turkey[20]. Thus there is no independent regional electricity system or any significant transmission constraints. For electricity imports from neighbouring countries, the emission factor of 0 ton of CO_2 per MWh is applied.

Turkish Electricity Sector[21]

Demand Side:

Gross electricity demand (Gross Generation + Imports – Exports) in Turkey rose at a rate of 8.0% per annum for the last three decades since 1975, that reflects one of the basic indicators of an emerging economy. Gross electricity demand in Turkey reached 198,085 GWh in 2008, which makes Turkey

[20] TEİAŞ and Energy Efficiency and Renewable Energy, Turkey - National study, Pr Ahmet Koyun, Termodinamik Anabilim Dal, Yildiz Teknik Universitesi, March 2007, Page 71
[21] http://www.teias.gov.tr/ist2007/index.htm

one of the ten largest markets for electricity among European countries. Even the devastating earthquake that hit Turkey in 1999, and the economic crisis in 2001, could not reverse this robust growth record. In 1999, consumption grew by 4.5% despite the decline in GDP by 5%. In 2001, Turkey's electricity consumption dropped only 1.1% whereas GDP shrank by 7.5%. Parallel to the gross demand, the net consumption figure reflects an average of 7.9% increase since 1975, reaching to 161,948 GWh in 2008. Although there has been significant improvements in the recent years, Turkey's per capita electricity consumption figure is 2,053 kWh (as of 2006), which is one of the lowest among European countries. [22] According to International Energy Agency (IEA) statistics, OECD average per capita electricity consumption is 8,381 kWh in 2006, which is an indicator of the growth potential in Turkey. [23] This figure has been 3,258 kWh among CEE countries. [24] Per capita consumption is expected to increase to 5,050 kWh by 2020 according to the MENR base case demand growth scenario, and with a projected annual population growth rate of 1.5%.

Supply Side:

Installed capacity and electricity generation in Turkey increased in line with consumption growth in recent decades. In 2008, electricity generation reached 198,418 GWh while imports stood at 789 GWh – 0.40% of total supply. Turkey became an importer in the mid-1970s, however, the share of imports in total supply never exceeded 3.6% for the last 20 years. The imports reached its peak as a portion of total supply in 1984 with 8%. By the end of 2008 the installed capacity of Turkey reached 41,817 MW, representing a CAGR of 8.0% since 1975. The rate of the increase in the capacity was well above 10% from 1970 to 1980. 48.2% of the installed capacity of 41,817 MW in 2008, was held by the State Generation Company EUAS, 9.2% by Affiliated Partnerhips of EUAS, 0.6% Mobile Power Plants and the remaining 42.0% owned by autoproducers, Production companies, TOOR and ADÜAŞ. There is an increasing trend in favor of IPPs, switching away from the State Generation Company in the recent years. When we compare the breakdown of the installed capacity in 2000, we see that EUAS's contribution to the installed capacity was 80% whereas the IPPs' share was only 9%. This is a concrete indication of the trend of the generation in favor of independent producers. The contribution of thermal power has always been the dominant source in both the generation and the installed capacity. In 2008, thermal power plants accounted for the 66.0% of the installed capacity whereas the hydro power plants' contribution was 33.1%. This is one of the lowest figures since 1970. On the other hand geothermal and wind powered capacity is still negligible with 0,9%. The existing electricity grid in Turkey is an interconnected single entity which to a larger extend fed by fossil fuel fired power plants.

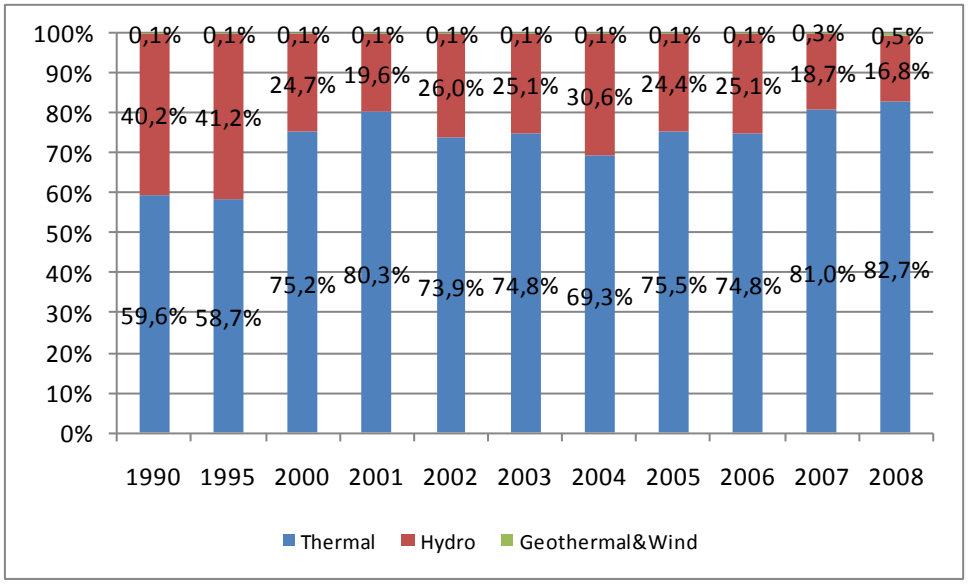


Figure 4: Electricity Production Fuel Type [25]

[22] http://www.iea.org/Textbase/country/maps/EUROPE/ele_pop.htm
[23] http://www.iea.org/Textbase/stats/indicators.asp?COUNTRY_CODE=28
[24] http://www.iea.org/Textbase/stats/indicators.asp?COUNTRY_CODE=33
[25] Source: http://www.teias.gov.tr/istatistik2008/32(75-08).xls

The figure below displays the forecast in increasing demand along the years between 2009 and 2018. The supply projection is based on the planned projects for energy production but it is very probable that, under increasing pressure of increasing demand, the government will shift to thermal power plants as they present higher financial feasibility with relatively short construction periods.

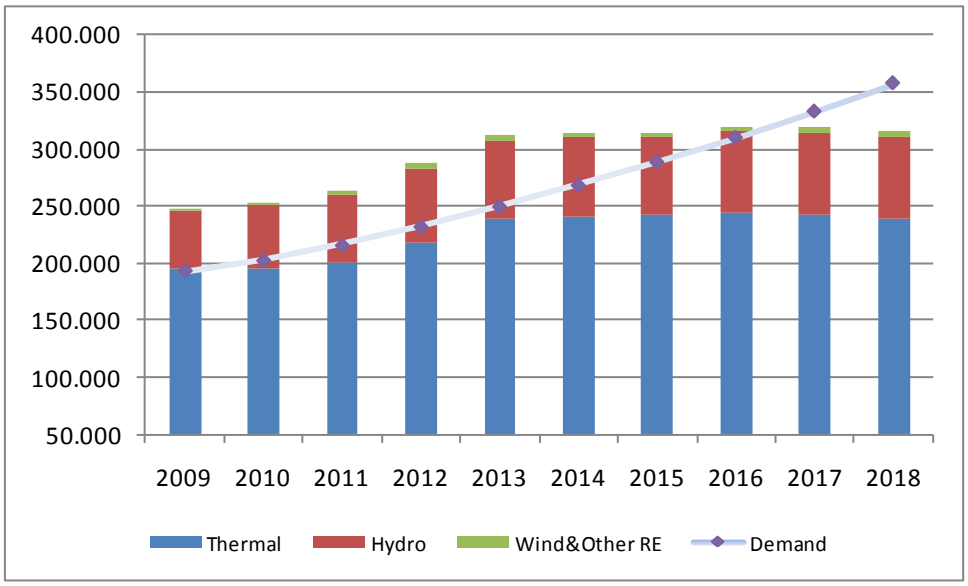


Figure 5: Electricity Supply and Demand Projections for Turkey[26]

Turkish Renewable Energy Sector

Although Turkey has not committed to cap on its GHG emissions and will not be a host for Clean Development Mechanism (CDM) or Joint Implementation (JI) projects until the end of 2012 under Kyoto Protocol,), having signed the United Nations Framework Convention on Climate Change it is committed to managing greenhouse gas emissions. The goal is to maintain emissions at the level of 1990 (3,15 per capita). Therefore, Turkish government keeps focusing on renewables.

Turkey enacted its first specific renewable energy law in 2005, but there are also provisions regarding renewable energy in the Electricity Market Law (EML), which authorises the Energy Market Regulatory Authority (**"EMRA)** to take measures to promote renewable energy use and in secondary legislation:

- The Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy[27] (**"Law"**) was adopted on 18 May 2005. This article provides as overview of the general provisions of the Law, as well as other supporting legislation regarding renewable energy resources. However, the legislation on bio-fuel will not be taken into account.[28]
- Renewable energy resources (**"RER"**) is not a brand-new topic, as the Electricity Market Law [29](**"EML"**), which was enacted in March 2001 and the Electricity Market License Regulation[30] (**"Regulation"**) demonstrate. According to the EML, EMRA is authorized to take the necessary measures to encourage the utilization of RER.
- According to the European Council Decision of 23 January 2006 on the principles, priorities and conditions contained in the Accession Partnership with Turkey[31], one of the short-term

26 Source: http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf

27 Law No. 5346, published in the Official Gazette dated 18 May 2005 and numbered 25819.

28 See Petroleum Market Law No. 5015, published in the Official Gazette dated 20 December 2003 and numbered 25322; Petroleum Market License Regulation, published in the Official Gazette on 17 June 2004 and numbered 25495; Regulation on Technical Criteria for Petroleum Market, published in the Official Gazette on 10 September 2004 and numbered 25579.

29 .Law No. 4628, published in the Official Gazette dated 3 March 2001 and numbered 24335

30 Published in the Official Gazette dated 4 August 2002 and numbered 24836; see moreover Electricity Market Grid Regulation, published in the Official Gazette dated 22 June 2003 and numbered 25001; Regulation on Balancing and Settlement, published in the Official Gazette dated 21 December 2004 and numbered 25677; Communiqué Regarding the Principles and Procedures of Financial Settlement, published in the Official Gazette dated 4 November 2003 and numbered 25279.

31 OJ 2006 L 22/34.

priorities identified for Turkey relates to "[s]tart alignment on the *acquis* on energy efficiency and renewable energy sources and develop administrative capacity in these sectors". Therefore, the new Law contains new incentives for RER development.

Objective and Scope of the Law

It is important to note that there is no region specific regulation and law in Turkey as it is not a federal state. The purpose of the Renewable Law is "to expand the use of renewable energy resources for generating electricity and to benefit from these resources in a secure, economic and qualified manner; and to increase the diversification of energy resources, reduce greenhouse gas emissions, assess waste products, protect the environment and develop the related manufacturing sector to realize these objectives."

The Renewable Law covers wind, solar, geothermal, biomass, biogas, wave, stream, tidal, river and arc type hydroelectric generation facilities and hydroelectric generation facilities either canal or run of river type or with a reservoir area of less than 15 km^2.

Incentives provided by the Renewable Law and Electricity Market Licensing Regulation

Renewable Energy Law

(a) Development plans which might have a negative effect on the use and efficiency of RER areas can no longer be created on public land.

(b) Each legal entity holding a retail sale licence must purchase a specified amount of electrical energy from RER certified generators which have been in generation for less than 10 years. This amount is based on a comparison between the amount of energy sold by that retail sale licence holder, in the previous calendar year, and the total electrical energy offered for sale by all retail sale licence holders in Turkey.

The price of electrical energy bought in accordance with this provision is determined by EMRA and is the average Turkish wholesale price announced in the previous year. This amount is 9.67 Ykr/Kwh in 2007 (approximately 5 Euro cents). The retail price must be between 5.0 and 5.5 Euro cents but a generator can sell its electrical energy for a higher price if there is market demand.

In practice all generators are currently selling their electrical energy to the Market Financial Reconciliation Center, which currently offers the highest price in Turkey due to a recent supply gap.

(c) Real persons and legal entities establishing an isolated electricity generation plant and grid supported electricity generation plant; using hydraulic resources with a maximum installed capacity of 1,000 kW that is to be used solely to satisfy their own needs, are not required to pay service charges for these projects. This is provided that the final design, planning, master planning, preliminary surveying and first auditing were prepared by either the DSI (State Hydraulic Works) or the EIE (Electrical Power Resources Survey and Development Administration).

(d) The sale price, rent, rights of access and usage permissions of state owned land are subject to an 85% reduction where the property is used for the purpose of generating electrical energy from RER which fall within the scope of the Renewable Law. ORKOY (General Directorate of Forest and Village Relations) and forestation special allowance revenue are not charged for forested land.

(e) Within the framework of the Renewable Law: (i) investment in energy generation facilities; (ii) procurement of domestically manufactured electromechanical systems; (iii) investment in research, development and manufacturing in the scope of electricity generation systems using solar cells and concentrated collectors; and (iv) investment in research and development facilities for the generation of electrical energy or fuels by utilizing biomass resources, can benefit from incentives determined by the Council of Ministers. Nevertheless, despite good intention of the government to promote electricity generation from renewable energy sources,

it is not possible to say that the incentives provided so far are sufficient or the existing incentives are applied properly.

Licensing Regulation

Legal entities applying for Licences for the construction of facilities based on domestic natural resources and RER only pay 1% of the total licensing fee and do not pay annual Licence fees for the first 8 years following completion of the facility.

Legal entities engaged in generation activities at facilities based on RER can purchase electricity from private sector wholesale companies on the condition that they do not exceed the annual average generation amounts indicated in their Licences for that calendar year.

TEIAS and/or legal entities holding distribution Licences must give priority for connection of generation facilities to the system based on whether they use domestic natural resources and RER.

Licence guarantee

Since November 2007 EMRA has been requesting bid bonds and performance bonds for Licence applications. Bid bonds with an amount of 10,000 YTL per mw are requested at the application stage and, if EMRA approves the application, a performance bond, with an amount to be calculated in accordance with the capacity to be installed, is also requested.

Renewable Energy Resource (RER) Certificates

If and when requested by any legal entity holding a generation Licence, a RER certificate must be granted by EMRA for the purpose of identifying and monitoring the resource type used in electrical energy generation or for the purpose of accessing the incentives applicable under the Renewable Law.

The principles and procedures relating to RER certification are governed by secondary legislation issued by EMRA in 2005. There are two types of RER certificates which govern the:

(a) type of resource utilized to generate electrical energy; and

(b) incentives that the owner is entitled to under the Renewable Law.

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

2.4 Baseline Scenario

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

In this case “the project electricity system” and “the connected system” are same as also confirmed by TEIAS (Turkish Electricity Transmission Company Inc.), [32] the Turkish transmission system is interconnected. There is not an independent regional grid system neither in Adana nor in the Mediterranean Region.

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

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

On the other hand, there is no spot electricity market available in the country as suggested in the other criteria “In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 percent between the systems during 60 percent or more of the hours of the year.” Therefore, this criterion is not applicable as well.

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

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

Since the project is an installation of a new grid-connected renewable power plant, the baseline scenario is formulated in ACM0002 / Version 13 0.0: *“Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the Combined Margin (CM) calculations described below”.*

According to the “Baseline Methodology Procedure” in “Tool to calculate the emission factor for an electricity system, Version 02.1.0” following steps should be followed.

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

STEP 1: Identify the relevant electricity system

The project electricity system is defined as “the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints” in the “Tool to calculate the emission factor for an electricity system, Version 02.01.0” page 3. Similarly, “a connected electricity system, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint” in the same document.”

In the project’s case “the project electricity system” and “the connected system” are same. As also confirmed by TEIAS (Turkish Electricity Transmission Company Inc.), the Turkish transmission system is interconnected. There is an independent regional grid system neither in Adana nor in Mediterranean Region.

In addition to this, since there is no DNA in the host country to delineate the project electricity system, the suggested criterion in “Tool to calculate the emission factor for an electricity system, Version 02.01.0” was used. According to this, 1-The capacity usage figure for the transmission line should be checked. 2-Spot market prices of different systems in the country should be compared.

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

On the other hand, there is no spot electricity market available in the country as suggested in the other criteria “In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 percent between the systems during 60 percent or more of the hours of the year.” Therefore, this criterion is not applicable as well.

As suggested in “Tool to calculate the emission factor for an electricity system, Version 02.01.0”, “if these criteria do not result in a clear grid boundary, use a regional grid definition in the case of large countries with layered dispatch systems (e.g. provincial / regional / national).” However, there are no layered dispatch systems in the host country. As a result the national grid was used as the project electricity system. Hence, the estimation of OM (Operating Margin) and BM (Built Margin) are based on the definition of the Turkish electricity network as one single interconnected system.

The interconnected electricity transmission grid of Turkey is as shown below:

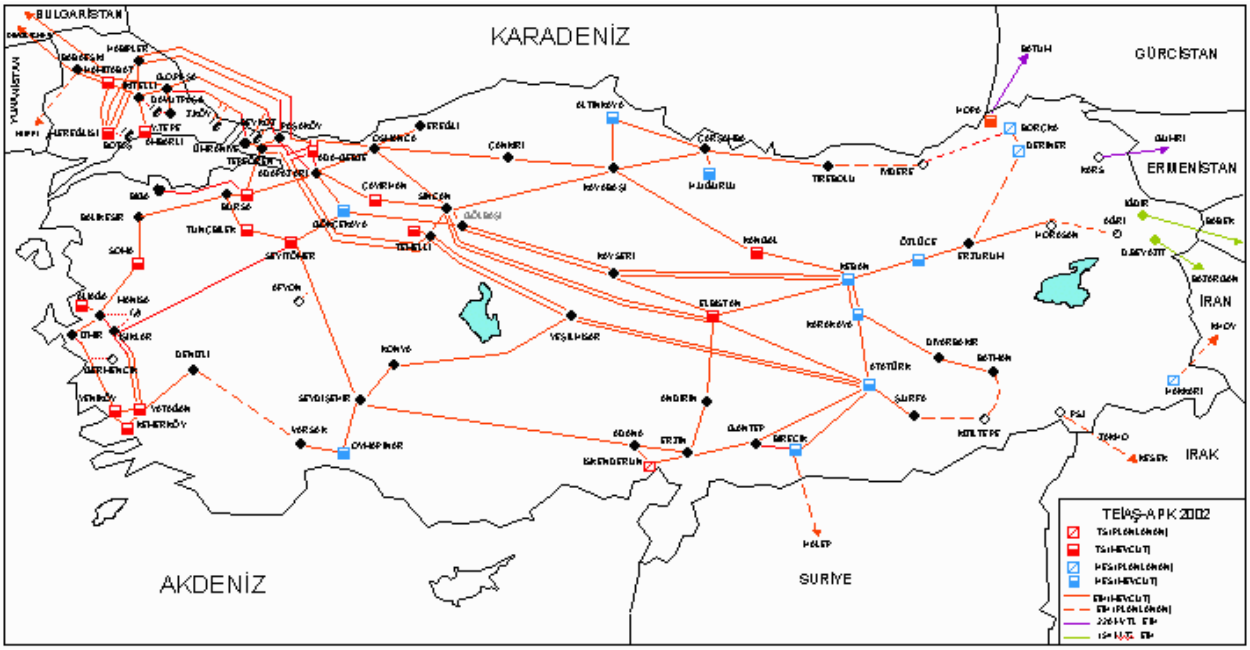


Figure 6: Turkey’s Electricity Transmission Grid[33]

The electricity produced in any power plant is transmitted to the national grid and the produced electricity is distributed to the consumers via the local distribution companies. Turkey is divided into 21 regions for the distribution of the electricity. The electricity distribution regions of the country are as shown below[34]:

[33] http://www.geni.org/globalenergy/library/national_energy_grid/turkey/turkishnationalelectricitygrid.shtml
[34] http://kojenerasyon.com/duyurular/2005/03/09/0.htm

Figure 7: Electricity Distribution Regions on Turkey Map

REGION NO	PROVINCES INCLUDED IN THE REGION	REGION CENTRE	REGION NAME
1	Batman, Diyarbakır, Mardin, Siirt, Şanlıurfa, Şırnak	Diyarbakır	Dicle Electricity Distribution Company (Dicle EDAS)
2	Bitlis, Hakkari, Muş, Van	Van	Vangölü Electricity Distribution Company (Vangölü EDAS)
3	Ağrı, Ardahan, Bayburt, Erzincan, Erzurum, Iğdır, Kars	Erzurum	Aras Electricity Distribution Company (Aras EDAS)
4	Artvin, Giresun, Gümüşhane, Rize, Trabzon	Trabzon	Çoruh Electricity Distribution Company (Coruh EDAS)
5	Bingöl, Elazığ, Malatya, Tunceli	Elazığ	Fırat Electricity Distribution Company (Firat EDAS)
6	Sivas, Tokat, Yozgat	Sivas	Çamlıbel Electricity Distribution Company (Camlibel EDAS)
7	*Adana, Gaziantep, Hatay, Kilis, Mersin, Osmaniye*	*Adana*	*Toroslar Electricity Distribution Company (Toroslar EDAS)*
8	Konya, Karaman, Kırşehir, Nevşehir, Niğde Aksaray	Konya	Meram Electricity Distribution Company (Meram EDAS)
9	Ankara, Bartın, Çankırı, Karabük, Kastamonu, Kırıkkale, Zonguldak	Ankara	Başkent Electricity Distribution Company (Baskent EDAS)
10	Antalya, Burdur, Isparta	Antalya	Akdeniz Electricity Distribution Company (Akdeniz EDAS)
11	İzmir, Manisa	İzmir	Gediz Electricity Distribution Company (Gediz EDAS)
12	Balıkesir, Bursa, Çanakkale, Yalova	Bursa	Uludağ Electricity Distribution Company (Uludag EDAS)
13	Edirne, Kırklareli, Tekirdağ	Tekirdağ	Trakya Electricity Distribution Company (Trakya EDAS)
14	İstanbul Anadolu Yakası	İstanbul Anadolu Yakası	İstanbul Anadolu Yakası Electricity Distribution Company (AYEDAS)
15	Bolu, Düzce, Kocaeli, Sakarya	Sakarya	Sakarya Electricity Distribution

			Company (Sakarya EDAS)
16	Afyon, Bilecik, Eskişehir, Kütahya, Uşak	Eskişehir	Osmangazi Electricity Distribution Company (Osmangazi EDAS)
17	İstanbul Avrupa Yakası	İstanbul Avrupa Yakası	Boğaziçi Electricity Distribution Company (BEDAS)
19	Aydın, Denizli, Muğla	Denizli	Menderes Electricity Distribution Company (Menderes EDAS)
20	Adıyaman, Kahramanmaraş	Kahramanmaraş	Göksu Electricity Distribution Company (Goksu EDAS)
21	Amasya, Çorum, Ordu, Samsun, Sinop	Samsun	Yeşilırmak Electricity Distribution Company (Yesilirmak EDAS)

Table 5: Electricity Distribution Regions of Turkey

For each project which is connected to Turkey's national grid transmits its electricity to the national grid and sell the produced electricity to the Electricity Distribution Company in the region or to big consumers via bilateral agreements. Also, in Eglence I-II project case, the electricity produced in the power plant will be transmitted to the Turkey's national grid physically and the produced electricity will be sold to Toroslar Electricity Distribution Company (Toroslar EDAS), if the company does not enter into bilateral contracts with a big electricity consumer.

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

According to "Tool to calculate the emission factor for an electricity system, Version 02.01.0", the OM and BM values can be calculated based on the following two options:

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

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

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

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

According to "Tool to calculate the emission factor for an electricity system, Version 02.01.0", four alternative methods to calculate OM can be chosen. In choosing the right method for the calculation of OM, "Simple adjusted OM", "Dispatch data analysis OM" and "Average OM" methods are eliminated since all these methods require power plant specific information of power plants which are connected to the grid. However, no power plant specific information is available. Similarly, option A and option B of "Simple OM" methods were also eliminated as again there is no power plant specific data is publicly available.

All in all, option C of "Simple OM" method was adopted as "the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system" is the only available data in the host country.

Simple OM option C method is eligible when low cost and/or must run resources constitute, as an average of the five most recent years, less than 50 percent of the total generation for the grid. Nevertheless, the only relevant low operating cost and must run resource in Turkey is hydropower

because the share of all other renewable resources is close to nil and therefore can be assumed negligible. The share of all non-hydro renewable resources in the entire electricity generation is 0,5 percent for the years between 2000 and 2008. There is no example of coal being used as must-run and nuclear energy is not practiced in Turkey.

As depicted in Table 6[35] the share of low-cost/must run resources were never higher than 50 percent between 2000 and 2009. Also, according to the TEIAS statistics, the share of hydroelectricity production of Turkey has not exceeded 50% for 20 years (since 1989). [36]

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Turkey's Gross Electricity Production (GWh)	124.922	122.725	129.400	140.581	150.698	161.956	176.300	191.558	198.418	194.813
Electricity Production from Hydro (GWh)	30.879	24.010	33.684	35.330	46.084	39.561	44.244	35.851	33.270	35.958
Total share of Hydro(%)	25%	20%	26%	25%	31%	24%	25%	19%	17%	18%

Table 6: Share of hydroelectric production in Turkey, 2000 – 2009

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

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

According to "Tool to calculate the emission factor for an electricity system, Version 02.01.0", the formula given below is applied for computing the $EF_{grid, OMsimple, y}$.

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

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

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO2 emission factor in year y (tCO2/MWh)
FCi,y	=	Amount of fossil fuel type i consumed in the project electricity system in ye (mass or volume unit)
NCVi,y	=	Net calorific value (energy content) of fossil fuel type i in year y (GJ / mas volume unit)
EFCO2,i,y	=	CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)
EGy	=	Net electricity generated and delivered to the grid by all power sources ser the system, not including low-cost / must-run power plants / units, in ye (MWh)
i	=	All fossil fuel types combusted in power sources in the project electr system in year y

35 All data presented in the baseline calculations are provided from official sources as mentioned in related footnotes.Therefore, uncertainities of data sets were not estiamted.

[36] http://www.teias.gov.tr/istatistik2009/32(75-09).xls

y = Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data

In order to calculate the emission amounts from each fuel types, emission factors from IPCC website were used.[37] Three sets of emission factors were identified as minimum, medium and maximum values. To be conservative side, the minimum values are used in the OM calculations.

	kg CO_2/GJ			Default Carbon Oxidation Factor
	min	mid	max	
hard coal	92.8	96.1	100.0	1.0
lignite	90.9	101.0	115.0	1.0
fuel oil	75.5	77.4	78.8	1.0
diesel oil	72.6	74.1	74.8	1.0
natural gas	54.3	56.1	58.3	1.0
lpg	61.6	63.1	65.6	1.0
naphta	69.3	73.3	76.3	1.0
wind	0.0	0.0	0.0	-
hydro	0.0	0.0	0.0	-
geothermal	0.0	0.0	0.0	-
renew.+wastes	0.0	0.0	0.0	-
biogas	0.0	0.0	0.0	-

Table 7: Emission factors from IPCC

Turkey's GHG Emissions Inventories for year 2007 and 2008 are announced by Turkish Statistical Institute (TUIK). However, to be on the conservative side, CO2 emissions figures from electricity production are not taken from these announced figures, as the calculation method is not known and these figures are a bit higher than the calculated figures.[38], [39] As a result, for years 2007, 2008 and 2009, the CO2 emissions are calculated with the IPCC minimum values:

	2007	**2008**	**2009**
CO_2 Emmission from Electricity Production (tons)	98.352.660	104.062.368	98.532.497

Table 8 : CO_2 Emissions of Turkey from Electricity Production

The calculation of net electricity production is demonstrated below. [40] As the efficiency factor from gross to net electricity for thermal resources is not known, the overall relation between gross and net electricity production is assumed to be the same for thermal production. Table 7 shows the overall gross/net relation where the estimated net electricity production from thermal resources were calculated by using the same relation.

Electricity generation (EGy) [GWh]	**2007**	**2008**	**2009**
Gross Electricity Production	**191,558.1**	**198,418.0**	**194,812.9**
Net Electricity Production	**183,339.7**	**189,761.9**	**186,619.3**

[37] http://www.ipcc-nggip.iges.or.jp/EFDB/find_ef_s1.php
[38] http://www.tuik.gov.tr/PreHaberBultenleri.do?id=4078
[39] http://www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=488
[40] http://www.teias.gov.tr/istatistik2009/30(84-09).xls

Net/Gross	**0.957**	**0.956**	**0.958**
	4.29%	**4.36%**	**4.21%**
Gross Electricity Production from Thermal Sources	**154,983**	**163,919**	**156,583**
Net Electricity Production from Thermal Sources	**148,333**	**156,768**	**149,998**
Imports	**864**	**789**	**812**
Net Generated + Imports	**149,198**	**157,558**	**150,810**

Table 9: Net Electricity Production of Turkey from Thermal Sources

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

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

The last part of Step 1 is calculating the ratio of emissions and generation as follows:

	2007	**2008**	**2009**
OM (tCO_2/ MWh/)	0.6631	0.6638	0.6569

Table 10: OM Emission Factor for 2007 – 2009

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

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

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

As the weighted average of the figures between 2007 and 2009 is computed, the OM emission factor is 0.6613 tCO_2 / MWh.

STEP 5: Calculate the build margin emission factor

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

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

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

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

- Since the recently commissioned power plants are given in a yearly basis, it is not known which power plant is commissioned most recently. On the other hand, since Turkey's electricity production figure is 194.8 TWh, none of the 5 power plants can exceed the 20% of the electricity generation capacity of the entire grid.

- Instead, the Build Margin could also be computed by using the most recent capacity additions that comprise the 20 percent of the total system generation. This corresponds to 38.9 TWh which is 20 percent of the overall generation of 194.8 TWh.

The table in Annex 6 displays the details of generation from those plants in specific.

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

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

Where:

$EF_{grid, BM, y}$	Build margin CO2 emission factor in year y (tCO_2 / MWh);
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

There is no available CO2 emission data for the power units included in the BM calculation. The available data for on plant basis is the name, type, installed capacity and annual electricity production figures of these facilities. However, there is no available data for the electricity production figures of some small facilities, most probably because these projects are included in the "Other Projects". Therefore, annual electricity productions of these facilities were calculated with the following formula unless the exact production figures are reached. The data used in the BM calculation is provided from the Turkey's Capacity Projection Reports published in years: 2010[41], 2009[42], 2008[43] and 2007[44].

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

In addition to this the efficiency rates for the fuel consumption of these facilities should be added to the calculation (as the thermal plants do not consume 100% of the fuel which they are fed with). Therefore an efficiency figure which represents how efficiently the thermal power plant consumes the fuel was estimated for each facility group in line with the data provided by TEIAS.. Within the context of the calculation in this document, higher the efficiency figure means lower the CO2 emission (as the electricity calculation assumes that the electricity production is a function of the designed installed capacity not the efficiency. However, in theory the installed capacity of a plant increases with the higher efficiency).

Therefore, in the calculation of the $EF_{grid, BM, y}$, first $EF_{EL,m,y}$ values are calculated by using the formula (4) as suggested in the tool. Also, to calculate the $EF_{EL,m,y}$ values, the default efficiency figures listed under the

[41] http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf
[42] http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf
[43] http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2008.pdf
[44] http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202007.pdf

	Grid Power Plants	
Generation Technology	**Old Units (before and in 2000)**	**New units (after 2000)**
Coal	-	-
Subcritical	37%	39%
Supercritical	-	45%
Ultra-supercritical	-	50%
IGCC	-	50%
FBS	35,5%	-
CFBS	36,5%	40.0%
PFBS	-	41.5%
Oil	-	-
Steam turbine	37,5%	39%
Open cycle	30%	39.5%
Combined cycle	46%	46%
Natural Gas	-	-
Steam turbine	37,5%	37.5%
Open cycle	30%	39.5%
Combined cycle	46%	60%

Table 11: Default Efficiency Factors for power plants (Appendix 1 of the tool)

As seen in the table above, the efficiency figures of coal, oil and natural gas, for different generation technologies, are given in the tool. In Turkey, the generation technologies for natural gas and oil is "Combined cycle" and for coal "Subcritical". Default values for lpg and naphta are not given in the tool. Since there is no lpg fired power plant that exists in the BM calculation, this fuel type is excluded. However, the efficiency factor of naphta is calculated based on the electricity generation (GWh) and energy consumption (GJ) figures of the facilities between 2004 and 2009. As a result, the efficiency factor for naphta is calculated as 28.7%.

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

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

Table 12: Efficiency Factors used for BM Emission Factor Calculation

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

Fuel Specific Emission Factors

Carbon content factors for each fuel type (tC/TJ) refer to the factors stated in "2006 IPCC Guidelines for National Greenhouse Gas Inventories" and the fuel specific CO_2 emission factors were estimated

from the same factors. To be on the conservative side, minimum emission factors were used in the calculation.

Electric Efficiency Rates

The electric efficiency rates for different fuel types across ownership structures of the facilities (state owned vs privately owned vs mobile facilities) were calculated through actual energy consumption figures of these facility types in the last 3 years. All additional facilities were assumed to be equal to its specific group's average efficiency.

Electricity Production

The announced electricity production figures of the facilities which were commissioned in the period between September 17th, 2006 and December 31st, 2009.

The computations display a weighted Build Margin emission factor of 0.4499 tCO_2 / MWh.

STEP 6: Calculate the combined margin emissions factor

The baseline emission factor is the weighted average of the Operating Margin Emission Factor and Build Margin Emission Factor. The ACM0002 / Version 13 0.0 guideline recommends equal weight values for hydropower projects as seen in the formula below:

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

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (%)
w_{BM}	=	Weighting of build margin emissions factor (%)

The default values recommended by Methodological tool: "Tool to calculate the emission factor for an electricity system, Version 02.01.0" for w_{OM} and w_{BM} for activities other than wind and solar power generation projects are 0.5 and 0.5, respectively.

$$\mathbf{EF_{grid,\,CM,\,y} = 0.6613 \times 0.5 + 0.4499 \times 0.5}$$

Therefore resulting $EF_{grid,CM,y}$ is 0.5556 tCO_2/MWh

2.5 Additionality

Referred by the Baseline Methodology, the "Tool for the Demonstration and Assessment of Additionality (Version 06.01.0)" outlines a step by step approach for the assessment of additionality or in other words the emission reductions that would have occurred in the absence of the project.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

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

The alternatives available to the proposed Project that provide outputs or services comparable with the proposed VCS project activity include:

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

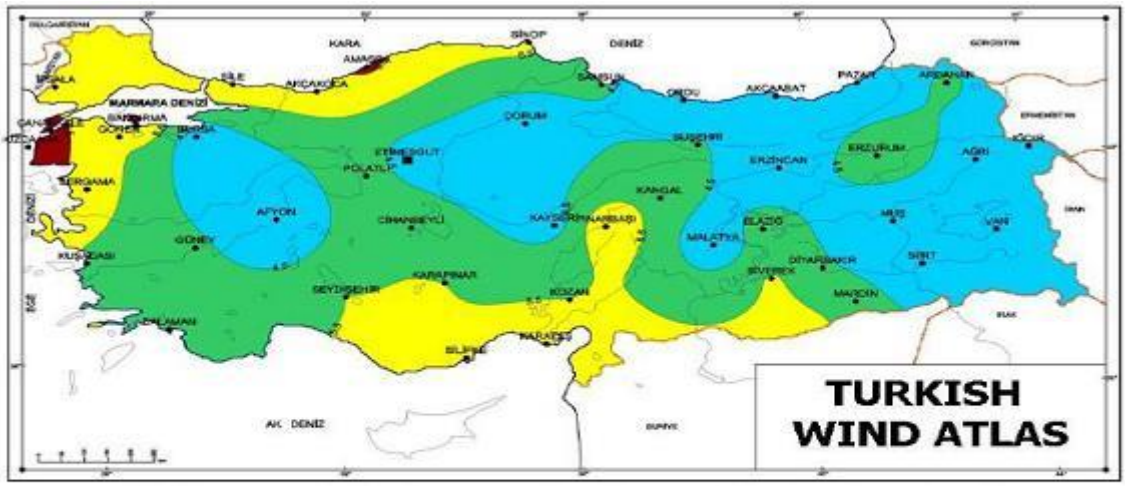
As it was stated in Section 1.11 Alternative 1 is in compliance with legal and regulatory requirements. Therefore, Alternative 1) is a credible alternative.

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

Although the coal and natural gas reserves in Turkey is very limited, there are many thermal power plants that are being commissioned in recent years and Turkey's grid mainly consists of thermal power plants.

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

Besides hydro energy, other renewable energies such as thermal and wind energies are likely to be considered for electricity generation. However, thermal generation requires a lot of input material, which is lacking in the area where the project is located. In addition, power plants using wind energy face unattractive financial index like the proposed hydropower project; most of new wind power generation projects in Turkey are applying for VER support, which shows that those projects are not themselves feasible and need VERs to overcome the investment barriers. In addition, due to its topography, the project area is not a proper location for a wind farm. Consequently, Alternative 3 is not a viable alternative and should be eliminated from further consideration.



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

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

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

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

Outcome of Sub-step 1a: Out of all the identified alternatives, Alternatives 1, 2 and 4 are plausible and realistic.

Sub-step 1b: Enforcement of applicable laws and regulations

As it was stated in 1.10, Alternative 1 is in compliance with legal and regulatory requirements. However, if the proposed Project is not undertaken as a VCS project activity, according to Step 2, the

proposed Project activity is economically or financially less attractive without the revenue from the sale of the VCS-VERs. Therefore, Alternative 1 is not a credible alternative.

Enda, the mother company of Egenda Ege Enerji Uretim A.S. has had experience in the management of a thermal power plant (Please refer to 1.15). Hence, Alternative 2 is a credible alternative.

When alternative 3 is considered: Besides hydro energy, other renewable energies such as biomass and wind energies are likely to be considered for electricity generation. However, biomass generation requires a lot of input material, which is lacking in the area where the project is located. In addition, power plants using wind energy face unattractive financial index like the proposed hydropower project; almost all the wind power generation projects in Turkey are applying for a VER support, which shows that those projects are not themselves feasible and need VERs to overcome the investment barriers. When it comes to wind power, the wind map of Adana clearly shows that the region is not wind-rich enough.[45] Consequently, Alternative 3) is not a viable alternative and should be eliminated from further consideration.

Alternative 4 is in compliance with legal and regulatory requirements. Based on the above analysis, it is a plausible and realistic alternative.
The following applicable mandatory laws and regulations have been identified for the proposed project activity:

1. Electricity Market Law [46]
2. Law on Utilisation of Renewable Energy Resources for the Purpose of Generating Electrical Energy[47]
3. Energy Efficiency Law[48]
4. Forest Law[49]
5. Environment Law[50]
6. Regulation on procedures and principles of signing the agreement of utilisation of water resources
   for the purpose of electricity production in the electricity market[51]
7. Regulation on Environmental Impact Assessment[52]

All energy projects are in compliance with the mandatory laws and regulations listed above except 2nd and 6th ones. “Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy” is only applicable for renewable energy projects. Also, “Regulation on procedures and principles of signing the agreement of utilization of water resources for the purpose of electricity production in the electricity market” is only applicable for hydropower projects. The electricity Market Law structures the market in general. Therefore, it is applicable for all projects in the electricity market. On the other hand, Forest Law, Environment Law, energy efficiency Law and the Regulation on EIA are also applicable for all alternatives.

Outcome of Sub-Step 1b

The alternatives discussed above are in line with applicable legal and regulatory requirements.

Step 2: Investment Analysis

[45] http://www.eie.gov.tr/duyurular/YEK/YEKrepa/ADANA-REPA.pdf
[46] Law number 4628, enactment date 03/03/2001, http://www.epdk.gov.tr/english/regulations/electricity.htm
[47] Law number 5346, enactment date 18/05/2005, http://www.eie.gov.tr/duyurular/YEK/LawonRenewableEnergyReources.pdf
[48] Law number 5627, enactment date 02/05/2007, http://www.eie.gov.tr/english/announcements/EV_kanunu/EnVer_kanunu_tercume_revize2707.doc
[49] Law number 6831, enactment date 31/08/1956. This will be made available to the DOE on request.
[50] Law number 2872. Published in Official Gazette No. 18132 on 11/08/‟83. This will be made available to the DOE on request.
[51] National Gazette number 25150, 06/06/2003
[52] National Gazette number 26939, 17/07/2008

The purpose of investment analysis is to determine whether the proposed project activity is economically or financially less attractive without carbon revenues than the remaining alternatives. To conduct the investment analysis, the following sub-steps are adhered to:

Sub-step 2a: Determine appropriate analysis method

The „*Tool for the Demonstration and Assessment of Additionality',* version 06.01..0, from EB69, lists three possible analysis methods:

- Option I: Simple cost analysis;
- Option II: Investment comparison analysis; and
- Option III: Benchmark analysis.

Since the proposed project generates financial and economic benefits via the sales of electricity other than carbon revenues, Option I cannot be used.

Option II is only applicable to projects where alternatives should be similar investment projects in terms of generation capacity. Between Option II and Option III, benchmark financial analysis (Option III) is selected as the analysis method.

As a result Option III: Benchmark Analysis is selected as the analysis method and the Equity IRR is selected as the financial indicator for the demonstration of the additionality of the project.

Sub-step 2b: Option III. Apply Benchmark Analysis

While applying the Benchmark Analysis, Option III, the Equity IRR is selected as the financial indicator for the demonstration of the additionality of the project as permitted in the additionality tool.

The relevant benchmark rate is calculated in line with the suggestion in "Tool for the demonstration and assessment of additionality" Version 06.01.0 which suggests to use the government bond rates, increased by a suitable risk premium. In relation to this, the benchmark rate is calculated in line with the Capital Asset Pricing Model (CAPM)[53]. The CAPM suggests below formula to calculate the discount rate (in other words benchmark rate).

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f)$$

where:

- $E(R_i)$ is the expected return on the capital asset
- R_f is the risk-free rate of interest such as interest arising from government bonds
- β_i (the beta coefficient) is the sensitivity of the asset returns to market returns, or also $\beta_i = \frac{\operatorname{Cov}(R_i, R_m)}{\operatorname{Var}(R_m)}$,
- $E(R_m)$ is the expected return of the market
- $E(R_m) - R_f$ is sometimes known as the market premium or risk premium (the difference between the expected market rate of return and the risk-free rate of return).

Risk Free Rate (R_f)

As the Turkish Eurobonds represent a risk-free rate, it must be increased by a suitable risk premium, which reflects the premium that investors demand for an average risk investment. The interest rate for Eurobond with longest duration of 30 years which US900123BG46 was 6.63% at the time of board decision on investment (June 2010, please see http://www.ziraat.com.tr/tr/bankamiz/faiz-ve-ucretler/aspx/eurobond.aspx for 30th of June 2010). However the maturity of this bond does not match with the investment duration which is 53 years. Therefore the yield of a synthetic bond with 53 years maturity at the time of decision was calculated using the yield curve derived from

53 Please see http://en.wikipedia.org/wiki/Capital_asset_pricing_model for the definition of CAPM

http://www.ziraat.com.tr/tr/bankamiz/faiz-ve-ucretler/aspx/eurobond.aspx was used. Please see Annex 4 to see the yield curve. According to this calculation the synthetic bond's yield should be around 7.29%.

The Beta Coefficient (β_i)

The Beta coefficient of securities with values close to 1 determines the company securities as being of average risk. There are four power generating and trading companies under trade in the Istanbul Stock Exchange (ISE). The βi for the Electricity Index is calculated as 0.939 by Bloomberg which is one of the prominent data suppliers in financial markets. (Please see Annex 6 for Betas of these companies)

Market risk premium ($E(R_m) - R_f$)

To estimate the "Market risk premium" of Turkey, the independent study of Aswath Damodaran – Stern School of Business (New York University) was used. The study offers an assessment of the market risk for different countries according to their credit ratings as the determined market risk premium for Turkey is 12.88%, calculated on the basis of the credit rating Ba3 with positive perspective given to Turkey by Stern School of Business.[54]

All in all, the relevant discount rate is calculated as:

$$7.29\%+0.939*12.88\%= 19.38\%$$

The above discount rate can easily be assumed as conservative as the above benchmark assumes that the benchmark and the project have same natures in terms of risk. However, the Beta of the index includes lower risk compared to the project, as the index includes already established companies (which are up and running). However, it is obvious that the project includes more risk compared to already established companies as there are extra construction risks and inexperienced operational risks for the project. Therefore, the Beta of the project should be significantly higher than the index Beta. All in all, we can say that the CAPM derived benchmark rate is conservative and also in consistency with the benchmark rates received from local bankers mentioned above.

IRR Calculation of the Project

The below IRR calculations which was prepared by using the information provided by the feasibility study prepared by the project developer in April 2005 reveals the fact that the project is not financially attractive.[55] Therefore, carbon revenues are crucial for the project. Aiming to show that the income of the GS VER is important for the financial performance of the project, two scenarios are presented in this section, one which excludes revenues from the sale of GS VERs and the second which includes the revenues from the sale of GS VERs. The assumptions used for this analysis are outlined as follows:

- The project lifetime is defined as 35 years as suggested by DSI (the estimated operational lifetime of the electromechanical equipments)
- The financial analysis is performed over the 37 year period (2 years for investment period and 35 years for the estimated operational lifetime of the electromechanical equipments as suggested by DSI). This therefore includes the investments made by the project owner during the construction phase and the operational costs along the lifetime of the project.
- The Equity IRR (Internal Rate of Return) of the project cash flow has been calculated.
- A tax rate of 20% is applied to the project in line with Turkish tax laws.

[54] http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem05.xls

[55] The feasibility report is prepared for 12 MW installed capacity, before the installed capacity revision. Therefore, the electricity production figure which is used in the financial analysis is different from the project's actual electricity production.

- The depreciation period of machinery and equipment was assumed as 15years and 40 years for buildings . For the energy transmission line the depreciation period is assumed as 30 years and for the other fixed assets the depreciation period is assumed as 20 years, as suggested in http://www.gib.gov.tr/fileadmin/user_upload/Yararli_Bilgiler/amortisman_oranlari2011.html
- The annual power generation figure is 205,299 kWh/year e power purchase price for the project is assumed to be 5,5 Euro cents (6.7 USD cents) per kWh which is the purchase guarantee offered by the State as an incentive to the investment (Please refer to Turkish Renewable Energy Law No: 5346 Article 6.c.) Please also note that this figure is above the assumption made in the Feasibility Study.
- Operating costs are calculated as suggested in the Feasibility Study prepared by the project developer.
- All assumptions and calculations are taken from the revision of feasibility calculations prepared on 21st June 2010. Calculations are based on measurements derived from plans and DSI (State Hydraulic Works) unit prices.
- The revenues from VERs are excluded from scenario 1, and included in scenario 2. The volume of VERs generated by the project is calculated by multiplying the annual electricity output of the project by the emission factor. For sensitivity analysis, the revenues related to the sale of the VERs are applied by multiplying the volume of VERs by the US$3, US$4 and US$5 price. The VERs are generated and sold for the first 10 years of the operational lifetime of the project.

Results

The cash flow analysis has been performed on two project scenarios;

- Scenario 1 – excludes revenues from the sale of VERs
- Scenario 2 – includes revenues from the sale of VERs

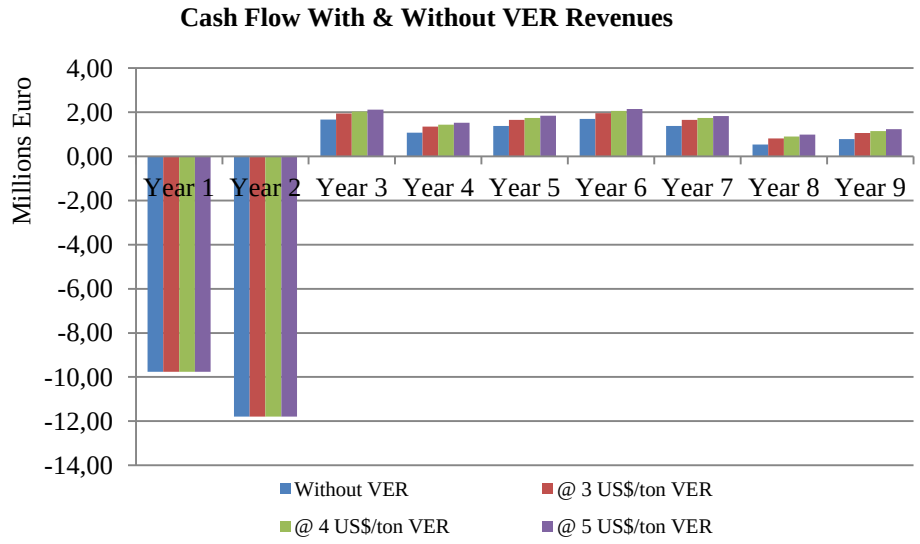


Figure 8: Project Cumulative Cash Flow Comparison, with and without VERs.

Below are the details of IRR estimations. ***(Table 13)***

Capacity & Production																						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**	**Year 19**	**Year 20**	**Year 21**	**Year 22**
		Sensitivity Coeffecient																				
Energy Production (1000 Kwh/year)			**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**	**205.299**
Energy (1000 KWh/year)		0,0%	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299	205.299
Sales Volume & Revenues																						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**	**Year 19**	**Year 20**	**Year 21**	**Year 22**
Loss & Pilferage Rate			1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Net Sales Volume (1000 Kwh/year)			203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246	203.246
Sales Prices (US$/Kwh)		**Sensitivity Coeffecient**																				
Seconder Energy		0,0%	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067	0,067
Price increase (%)			*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Sales Revenues (US$)			**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**
Seconder Energy			13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203	13.653.203
VAT to be Refunded	10.679.040		8.221.463	5.763.887	3.306.310	848.734	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
VAT Refund			2.457.577	2.457.577	2.457.577	2.457.577	848.734	0	0	0	0	0	0	0	0	0	0	0	0	0		
Cost of Goods Sold																						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**	**Year 19**	**Year 20**	**Year 21**	**Year 22**
General production expenses	609.258	609.258	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816
Depreciation			2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650
Total (US$/year)	**609.258**	**609.258**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**3.595.133**	**2.358.466**	**2.358.466**	**2.358.466**	**2.358.466**	**2.358.466**
Operating Expenses																						
Operating Expenses	609.258	609.258	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816	803.816
Working Capital																						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**	**Year 19**	**Year 20**	**Year 21**	**Year 22**
Days of Receivables			15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Receivables			671.282	671.282	671.282	671.282	604.247	568.883	568.883	568.883	568.883	568.883	568.883	568.883	568.883	568.883	568.883	568.883	568.883	568.883	568.883	568.883
Investment Details (US$)																						
	Year 1	**Year 2**		**Total**	**Weight**	**Sensitivity Coeffecient**				**Original Investment Amount**		**Weight**										
Etud, Project Design and Control	1.059.640	0		**1.059.640**	1%	0,0%					**1.059.640**	1%										
Expropriation	1.156.400	0		**1.156.400**	1%	0,0%					**1.156.400**	1%										
Site Construction	2.124.000	0		**2.124.000**	2%	0,0%					**2.124.000**	2%										
Regulator	2.419.000	2.419.000		**4.838.000**	5%	0,0%					**4.838.000**	5%										
Derivation Channel	240.720	361.080		**601.800**	1%	0,0%					**601.800**	1%										
Transmission Channel	302.080	453.120		**755.200**	1%	0,0%					**755.200**	1%										
Energy Tunnel 1	14.726.400	22.089.600		**36.816.000**	41%	0,0%					**36.816.000**	41%										
Loading Gate	814.200	1.899.800		**2.714.000**	3%	0,0%					**2.714.000**	3%										
Penstock	1.935.200	7.740.800		**9.676.000**	11%	0,0%					**9.676.000**	11%										
Powerhouse	932.200	3.728.800		**4.661.000**	5%	0,0%					**4.661.000**	5%										
Turbines & Generators	2.520.000	10.080.000		**12.600.000**	14%	0,0%					**12.600.000**	14%										
Auxilary Equipment	480.000	1.920.000		**2.400.000**	3%	0,0%					**2.400.000**	3%										
Transformators	710.000	2.840.000		**3.550.000**	4%	0,0%					**3.550.000**	4%										
Energy Transmission Line	767.000	3.068.000		**3.835.000**	4%	0,0%					**3.835.000**	4%										
Installment	0	1.416.000		**1.416.000**	2%	0,0%					**1.416.000**	2%										
Transportation&Customs	0	400.000		**400.000**	0%	0,0%					**400.000**	0%										
Commissioning	0	47.200		**47.200**	0%	0,0%					**47.200**	0%										
General Expenses	153.400	153.400		**306.800**	0%	0,0%					**306.800**	0%										
Others (Construction period personnel and admin costs)	400.000	400.000		**800.000**	1%	0,0%					**800.000**	1%										
Unexpected	50.000	50.000		**100.000**	0%	0,0%					**100.000**	0%										
Total Investment Amount	**30.790.240**	**59.066.800**	**0**	**89.857.040**	**100%**						**89.757.040**	100%										

Depreciation

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22
Depreciation of New Investment																						
Buildings			1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650
Energy Transmission Line			127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833	127.833
Machinery and Equipment			1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	1.236.667	0	0	0	0	0
Other			264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302	264.302
Total			**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**2.791.317**	**1.554.650**	**1.554.650**	**1.554.650**	**1.554.650**	**1.554.650**

Income Statement (US$)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22
Net Sales	**0**	**0**	**16.110.780**	**16.110.780**	**16.110.780**	**16.110.780**	**14.501.937**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**	**13.653.203**
Cost of Sales	-609.258	-609.258	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-3.595.133	-2.358.466	-2.358.466	-2.358.466	-2.358.466	-2.358.466
Gross Profit	**-609.258**	**-609.258**	**12.515.647**	**12.515.647**	**12.515.647**	**12.515.647**	**10.906.804**	**10.058.070**	**10.058.070**	**10.058.070**	**10.058.070**	**10.058.070**	**10.058.070**	**10.058.070**	**10.058.070**	**10.058.070**	**10.058.070**	**11.294.737**	**11.294.737**	**11.294.737**	**11.294.737**	**11.294.737**
General Administrative Expenses	-609.258	-609.258	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816	-803.816
Income from Operations	**-1.218.516**	**-1.218.516**	**11.711.831**	**11.711.831**	**11.711.831**	**11.711.831**	**10.102.988**	**9.254.254**	**9.254.254**	**9.254.254**	**9.254.254**	**9.254.254**	**9.254.254**	**9.254.254**	**9.254.254**	**9.254.254**	**9.254.254**	**10.490.921**	**10.490.921**	**10.490.921**	**10.490.921**	**10.490.921**
EBITDA	**-1.218.516**	**-1.218.516**	**14.503.148**	**14.503.148**	**14.503.148**	**14.503.148**	**12.894.305**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**	**12.045.571**
EBITDA Margin				*90%*	*90%*	*90%*	*89%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*	*88%*
Financing income / (expense), net	-571.068	-2.418.067	-3.601.649	-3.232.249	-2.862.849	-2.493.449	-2.124.049	-1.754.649	-1.385.249	-1.015.850	-646.450	-277.050	0	0	0	0	0	0	0	0	0	0
Other Income /(Expenses)- net			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Income before Tax	**-1.789.584**	**-3.636.583**	**8.110.183**	**8.479.582**	**8.848.982**	**9.218.382**	**7.978.939**	**7.499.605**	**7.869.005**	**8.238.405**	**8.607.805**	**8.977.205**	**9.254.254**	**9.254.254**	**9.254.254**	**9.254.254**	**9.254.254**	**10.490.921**	**10.490.921**	**10.490.921**	**10.490.921**	**10.490.921**
Taxation on income			0	-1.695.916	-1.769.796	-1.843.676	-1.595.788	-1.499.921	-1.573.801	-1.647.681	-1.721.561	-1.795.441	-1.850.851	-1.850.851	-1.850.851	-1.850.851	-1.850.851	-2.098.184	-2.098.184	-2.098.184	-2.098.184	-2.098.184
Deferred Taxation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Income before Monetary Gain / (Loss)	**-1.789.584**	**-3.636.583**	**8.110.183**	**6.783.666**	**7.079.186**	**7.374.706**	**6.383.151**	**5.999.684**	**6.295.204**	**6.590.724**	**6.886.244**	**7.181.764**	**7.403.404**	**7.403.404**	**7.403.404**	**7.403.404**	**7.403.404**	**8.392.737**	**8.392.737**	**8.392.737**	**8.392.737**	**8.392.737**
Monetary gain/(loss)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Income for the period	**-1.789.584**	**-3.636.583**	**8.110.183**	**6.783.666**	**7.079.186**	**7.374.706**	**6.383.151**	**5.999.684**	**6.295.204**	**6.590.724**	**6.886.244**	**7.181.764**	**7.403.404**	**7.403.404**	**7.403.404**	**7.403.404**	**7.403.404**	**8.392.737**	**8.392.737**	**8.392.737**	**8.392.737**	**8.392.737**

Cash Flow Statement (US$)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22
Net Income	-1.789.584	-3.636.583	8.110.183	6.783.666	7.079.186	7.374.706	6.383.151	5.999.684	6.295.204	6.590.724	6.886.244	7.181.764	7.403.404	7.403.404	7.403.404	7.403.404	7.403.404	8.392.737	8.392.737	8.392.737	8.392.737	8.392.737
Depreciation	0	0	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	2.791.317	1.554.650	1.554.650	1.554.650	1.554.650	1.554.650
Working Capital Requirement																						
Change in Trade Receivables	0	0	-671.282	0	0	0	67.035	35.364	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Change in Trade Payables	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Change In Other Assets	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Change Liabilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Investments	-30.790.240	-59.066.800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equity	9.737.114	11.666.123	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Debt - Loan	22.842.710	51.037.260	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Debt Repayments																						
Bank Loans			-7.387.997	-7.387.997	-7.387.997	-7.387.997	-7.387.997	-7.387.997	-7.387.997	-7.387.997	-7.387.997	-7.387.997	0	0	0	0	0	0	0	0	0	0
Cash Generated During the Year	0	0	2.842.220	2.186.986	2.482.505	2.778.025	1.853.506	1.438.368	1.698.524	1.994.044	2.289.563	2.585.083	10.194.720	10.194.720	10.194.720	10.194.720	10.194.720	9.947.387	9.947.387	9.947.387	9.947.387	9.947.387
Cumulative Cash Generated	0	0	2.842.220	5.029.205	7.511.711	10.289.736	12.143.242	13.581.610	15.280.134	17.274.177	19.563.741	22.148.824	32.343.544	42.538.264	52.732.985	62.927.705	73.122.425	83.069.812	93.017.199	102.964.586	112.911.973	122.859.360
Cash Flow to Equity	-9.737.114	-11.666.123	2.842.220	2.186.986	2.482.505	2.778.025	1.853.506	1.438.368	1.698.524	1.994.044	2.289.563	2.585.083	10.194.720	10.194.720	10.194.720	10.194.720	10.194.720	9.947.387	9.947.387	9.947.387	9.947.387	9.947.387

VER Revenues																					
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
Baseline EF	0,55560																				
Expected CO_2 Reduction (tons)		0	0	112.923	112.923	112.923	112.923	112.923	112.923	112.923	112.923	0	0	0	0	0	0	0	0	0	0	0
Expected VER Revenue@ 3US$/ton		0	0	338.770	338.770	338.770	338.770	338.770	338.770	338.770	338.770	0	0	0	0	0	0	0	0	0	0	0
Expected VER Revenue@ 4US$ton		0	0	451.694	451.694	451.694	451.694	451.694	451.694	451.694	451.694	0	0	0	0	0	0	0	0	0	0	0
Expected VER Revenue@ 5US$/ton		0	0	564.617	564.617	564.617	564.617	564.617	564.617	564.617	564.617	0	0	0	0	0	0	0	0	0	0	0
Cash Flow with VER																						
@ 3US$/ton VER		-9.737.114	-11.666.123	3.113.236	2.458.002	2.753.522	3.049.042	2.124.522	1.709.384	1.969.540	2.265.060	2.289.563	2.585.083	10.194.720	10.194.720	10.194.720	10.194.720	10.194.720	9.947.387	9.947.387	9.947.387	9.947.387
@ 4US$/ton VER		-9.737.114	-11.666.123	3.203.575	2.548.341	2.843.861	3.139.380	2.214.861	1.799.723	2.059.879	2.355.399	2.289.563	2.585.083	10.194.720	10.194.720	10.194.720	10.194.720	10.194.720	9.947.387	9.947.387	9.947.387	9.947.387
@ 5US$/ton VER		-9.737.114	-11.666.123	3.293.914	2.638.679	2.934.199	3.229.719	2.305.200	1.890.062	2.150.218	2.445.738	2.289.563	2.585.083	10.194.720	10.194.720	10.194.720	10.194.720	10.194.720	9.947.387	9.947.387	9.947.387	9.947.387
IRR Calculation without VER																						
IRR - 37 Years (Technical Lifetime)		16,9%																				
IRR Calculation with VER																						
IRR - 37 Years (Technical Lifetime)																						
@ 3US$/ton VER		17,4%																				
@ 4US$/ton VER		17,6%																				
@ 5US$/ton VER		17,8%																				

	Without VER	@ 3 US$/ton VER	@ 4 US$/ton VER	@ 5 US$/ton VER
37 Years (Technical Lifetime)	16,89%	17,42%	17,60%	17,79%

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

According to the revision of feasibility calculations of the proposed project, the parameters required for the calculation of key financial indicators are in **Table 14**:

Parameter56	Value	Reference Document and Explanation
Installed capacity (MWe)	68.65	Revised FSR Calculations dated June 2010
Grid connected output (MWh)	205,299	Revised FSR Calculations dated June 2010
Capital investment (US$)	89,680,640,0	Revised FSR Calculations dated June 2010
Income tax rate (%)	20.0	Corporate Tax Law, Art.32
Expected tariff ($/MWh)	0.067 (0.055 €/kWh)	Energy Efficiency Law, Art.17
Expected VER price ($/tCO2e)	3-5	Estimation
Depreciation ($)	2,791,317	Revised FSR Calculations dated June 2010
O&M ($/year)	803,816	RRevised FSR Calculations dated June 2010
Project lifetime (years)	35.0	Revised FSR Calculations dated June 2010
Exchange Rate (Euro/USD)	1.3720	Revised FSR Calculations dated June 2010
Loan : Equity Ratio	80:20	Revised FSR Calculations dated June 2010
Interest Rate (%)	LIBOR (6-month) +1.5	Assumption[57]
Benchmark rate (%)		19.38

Table 13: Basic Parameters for Financial Analysis

CONSTRUCTION EXPENSES	Eğlence-I ($)	Eğlence-II ($)	Total ($)

[56] Unless otherwise mentioned all figures are taken from the Feasibility Study parepared by SKOPSU in June 2008

[57] Although the realized interest rate for the project in the loan agreement and also the interest rate in the given presentation (***http://www.iso.org.tr/tr/documents/cevre/tkb.pdf*, *p.17***) for financing of renewable energy and energy efficiency projects are much higher, to be on the conservative side, the interest rate is assumed as "LIBOR (6-months) + 1.5%"

Site Construction	1.062.000,0	1.062.000,0	2.124.000,0
Regulator	2.596.000,0	2.242.000,0	4.838.000,0
Derivation Channel	330.400,0	271.400,0	601.800,0
Transmission Channel	755.200,0		755.200,0
Energy Tunnel 1	27.376.000,0	9.440.000,0	36.816.000,0
Loading Gate	1.416.000,0	1.298.000,0	2.714.000,0
Penstock	5.192.000,0	4.484.000,0	9.676.000,0
Powerhouse	2.360.000,0	2.301.000,0	4.661.000,0
			62.186.000,0
MACHINERY AND EQUİPMENT EXPENSES			
Turbines & Generators	6.800.000,0	5.800.000,0	12.600.000,0
Auxilary Equipment	1.200.000,0	1.200.000,0	2.400.000,0
Transformators	1.800.000,0	1.750.000,0	3.550.000,0
Energy Transmission Line	708.000,0	3.127.000,0	3.835.000,0
			22.385.000,0
OTHER			
Etud, Project Design and Control	531.000,0	528.640,0	1.059.640,0
Expropriation	500.000,0	480.000,0	980.000,0
Installment	708.000,0	708.000,0	1.416.000,0
Transportation&Customs	200.000,0	200.000,0	400.000,0
Commissioning	23.600,0	23.600,0	47.200,0
General Expenses	153.400,0	153.400,0	306.800,0
Unexpected	50.000,0	50.000,0	100.000,0
Others (Construction period personnel and admin costs)	400.000,0	400.000,0	800.000,0
			5.109.640,0
TOTAL	**89.680.640,0**		

Table 14: IRR inputs for İnvestment analysis

In addition to the above mentioned basic parameters of financial analysis, the load factor of the project activity has been analyzed. The load factors of the plant have separately been calculated in the feasibility calculation excel sheets presented before.

In order to calculate the load factor of a project activity, the following formula is used:
(annual generation figure/ installed capacity)/ 8,760.

(205,299 / 68.65) / 8,760 = 34%

When related figures regarding the project activity are used, the load factors of the plant has come out as 34% respectively.

2. Results of the Financial Analysis

Table 15 includes the results of the financial analysis for the Project, at the time that the decision to go ahead was made, both with and without VER financing. The IRR of the Project without VER financing was lower than the applicable benchmark rate of return. This therefore indicates that in comparison to alternative investments, the Project was financially unattractive in the absence of VER financing.

IRR Calculation without VER	
IRR - 37 Years (Technical Lifetime)	16.9%
IRR Calculation with VER	
IRR - 37 Years (Technical Lifetime)	
@ 3US$/ton VER	17.4%
@ 4US$/ton VER	17.6%
@ 5US$/ton VER	17.8%

Table 15: Summary of Project investment analysis without and with VER financing

3. Comparison of IRR for the proposed project to the financial benchmark

In accordance with benchmark analysis (Option III), if the financial indicators of the proposed project, such as the project IRR[58], are lower than the benchmark, the proposed project is not considered financially attractive.

Table15 highlights the project IRR with and without carbon revenues. Without the additional income to the project developer resulting from VER sales, the Equity IRR is 16.9%, which is lower than the financial benchmark. Thus, the proposed project is not financially attractive. However, taking VER revenues into consideration, the Equity IRR increases to 17.8% (with 5US$/ton VER price).

While the IRR with VERs remains lower than the financial benchmark of 19.38%, the Project Developer will also benefit from the following intangible benefits that VERs provide:

- A third party review of project documents will give extra confidence to both investors and financiers.
- Enhanced corporate green image of the project developer through its contribution to the clean source of electricity and the diversification of electricity sources in Turkey, which broadens stakeholder confidence.

Sub-step 2d: Sensitivity Analysis

Sensitivity analysis was applied to Investment Costs, Energy Production and Electricity Sales Price. Applying variations on investment costs, the range was considered to be in a bandwidth of +10% and –10% as advised in “Tool for the demonstration and assessment of additionality (Version 06.01.0).”

[58] For Benchmark Analysis, the IRR shall be calculated as equity IRR, according to the “Tool for the demonstration and assessment of additionality”, version 06.01.0.0, from EB69.

The sensitivity in the investment amount was applied to the investment items which represent equal or above 20% of the total investment amount (namely, "Regulator, tunnel & canals construction" and "Electromechanical Installments") as suggested by "Tool for the demonstration and assessment of additionality (Version 06.01.0)."

	IRR Sensitivity with Investment Costs				
Change in %	**-10%**	**-5%**	**0%**	**5%**	**10%**
Without VER	17,96%	17,41%	16,89%	16,41%	15,96%
IRR @3 Eur/ton VER	18,56%	17,97%	17,42%	16,91%	16,44%
IRR @4 Eur/ton VER	18,77%	18,16%	17,60%	17,08%	16,60%
IRR @5 Eur/ton VER	18,97%	18,36%	17,79%	17,26%	16,77%

Table 16: Sensitivity to Variation in Investment Costs

Variation on energy production was also applied in a bandwidth of +10% and –10%.

	IRR Sensitivity with Electricity Production				
Change in %	**-10,0%**	**-5,0%**	**0,0%**	**5,0%**	**10,0%**
Without VER	13,91%	15,36%	16,89%	18,49%	20,16%
IRR @3 Eur/ton VER	14,31%	15,83%	17,42%	19,09%	20,84%
IRR @4 Eur/ton VER	14,45%	15,99%	17,60%	19,30%	21,08%
IRR @5 Eur/ton VER	14,59%	16,15%	17,79%	19,51%	21,31%

Table 17: Sensitivity to Variation in Energy Production

Due to the fact that the feed in guaranteed tariff prices are fixed in Turkey, the unit energy price is not considered to be an exogenous variable. However, sensitivity on the upward side was also applied to see the effect of price changes.

	IRR Sensitivity with Electricity Price				
Change in %	**-10,0%**	**-5,0%**	**0,0%**	**5,0%**	**10,0%**
Without VER	13,91%	16,89%	16,89%	18,49%	20,16%
IRR @3 Eur/ton VER	14,36%	17,42%	17,42%	19,06%	20,78%
IRR @4 Eur/ton VER	14,51%	17,60%	17,60%	19,26%	20,99%
IRR @5 Eur/ton VER	14,67%	17,79%	17,79%	19,46%	21,20%

Table 18: Sensitivity to Variation in Energy Production

The above benchmark and accompanying sensitivity analyses reveal the fact that no alternative scenario, with or without VER revenues, can make the project pass the benchmark IRR expectation. The equity IRR without VER revenues of the project, even with a increase of 10% in the investment amount cannot exceed 19.38% which is lower than the benchmark rate. In the same sense, a 5%

increase in the energy production and energy price makes the investment financially attractive barely without future carbon revenue. On the other hand, only in case of a 10% increase in the energy

production and energy price makes the investment financially attractive and the equity IRR with or without future VER revenues approaches or exceeds the benchmark rate. However, in fact a capacity change or increase is not planned and expected in next years. Also, when the electricity tariff prices of last years (2009, 2010, 2011 and 2012)[59] are compared with each others, a %10 increase in the energy prices is not expected in the following years.

***STEP 3* – Barrier analysis**

Not applicable for this project.

Project Timeline:

Events and Actions	Date
First Feasibility Report	April 2005
Water Usage Agreement for EglenceI-II	November 27th 2007
Licenses granted by EMRA	27th December 2007
Contact with PDD Consultants	March 2009
Local Stakeholder Consultation Meeting	24-25th November 2009
EIA Reports for Eglence I-II	May 31st 2010
Revision of Feasibility Calculations	June 2010
Internal e-mail exchanges regarding the feasibility calculation and carbon financing	30th June 2010
EIA Positive Report for Eglence I	July 28th 2010
EIA Positive Report for Eglence II	July 30th 2010
Construction Agreement –Start date of the project activity (first real action)	14th December 2010
Preparation of General Financial Feasibility Analyses	February 11th 2011
Agreement with the DOE	March 2011
Electromechanical equipment agreements	May 9th 2011
Loan Agreement with the Bank	July 7th 2011
Commissioning of the Eğlence-II power plant	26th March 2013
Commissioning of the Eğlence-I power plant	04th June 2013
Start of VER validation	April 10th 2013

Table 19: Project Timeline

Step 4: Common Practice Analysis

[59] http://www.epdk.gov.tr/index.php/elektrik-piyasasi/tarifeler?id=95

The "Tool for the demonstration and assessment of additionality, Version 06.1.0") was followed for common practice analysis. In Sub-step 4b EB69 Annex 20 was applied in line with the tool.

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

Even though Turkey has significant hydroelectric power resources, fossil fuels remain the main source of energy production in the country. Gas, oil and coal represent about 64% of total power production.

However, there are more than 100 hydropower plants, with total installed capacity of 17,137 MW generating an average of 52,339GWh/year as of 2011, which is 41% of the economically viable hydroelectric potential of Turkey, 127,381 GWh/year[60].

Having not been able to use all economically usable water potential, Turkey utilises 41% of 112 billion m³ per year by means of facilities developed so far. Turkey targets to make use of all economic and technical water potential, which is 112 billion m³ by the year of 2023 which is the anniversary of Turkish Republic. The government has financed most of the existing power plants. According to the the State Hydraulic Works (DSI) report in 2009, DSI has developed 10,700 MW out of the 13,000 MW of the then total installed capacity in Turkey, representing 80% of the total hydroelectric capacity in the country, and also, it built 20 of the 25 largest hydroelectric power plants[61]
In order to promote even more the electricity generation, in March 2001, a new Electricity Market Law was enacted. This law sets the stage for liberalization of power generation and distribution activities. And, in May 2005, Turkey adopted a Renewable Energy Law, taking a first step towards the implementation of renewable energies in the country.
However, in spite of these efforts, according to the Turkish Electricity Generation Company (EÜAŞ), only 32.4% of the hydroelectric installed capacity has a private participation[62], which shows that there is a lack of investor interest. Facing the growing demand for electricity and lacking the capital to realize hydro investment, the State outsourced the construction of those plants through licenses. As seen in the table below, the number of projects that are close to completion is very low. The low rate of completion of the projects confirms the barriers elaborated above and also proves that the electricity generation from HEPP business is not a common practice.

Completion Ratio (%) ***(for pairs, end percentages are exclusive)***	**Number of Facilities**
<10% Completed	215
10% - 20% Completed	57
20% - 30% Completed	39
30% - 40% Completed	23
40% - 50% Completed	25
50% - 60% Completed	18
60% - 70% Completed	18
70% - 80% Completed	17
80% - 90% Completed	19
>90% Completed	37

[60] http://www2.dsi.gov.tr/english/service/enerjie.htm
[61] DSI in brief- General Directorate of State hydraulic works (DSI) 1954-2009", page 33 http://www2.dsi.gov.tr/english/pdf_files/dsi_in_brief2009.pdf
[62] http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/kguc(1-12)/7.xls

Table 20: Number of HEPP facilities completed over a certain completion ratio[63]

When the electricity generation figures of HEPPs and Turkey's total electricity generation figures are considered, it is very clear that the use of hydropower in electricity generation, especially from privately held hydropower plants is very low and not common practice. The total electricity generation from hydropower fluctuated in years and reached 52,339 GWh in 2011, while it was 46,142 GWh, the previous high in 2004. (Please see the table below for the details of the comparison of hydropower plants and Turkey's national grid with respect to electricity generation figures.) All in all, the share of electricity generation from hydropower corresponded to 23% of the total generation. When it comes to privately owned hydropower plants, the share of electricity generation was only 6.7% of total generation in 2011 (Table 20). In terms of the installed capacity, the share of the private hydro capacity in Turkey's total capacity was just 10.5%. The private participation even in the total renewable category (wind+geothermal+hydro) amounted to only 8.5% of the total generation as of 2011 (Table 21). This signals that the involvement of the private enterprise in hydropower plant investment is not significant yet. The lack of experience in operating a hydropower plant, delays in construction due to unexpected factors, geographical factors and problems in financing also contribute to the currently low rate of private hydropower investment.

	2011	2010	2009	2008	2007	2006	2005	2004
Installed Private Hydropower Capacity MW	5,548	4,153	2,876	2,373	2,080	1,961	1,817	1,670
Installed State Hydropower Capacity MW	11,590	11,678	11,678	11,456	11,462	11,176	11,110	10,995
Installed Total Hydropower Capacity MW	17,137	15,831	14,553	13,829	13,541	13,137	12,926	12,664
Total Turkey Capacity MW	52,911	49,524	44,761	41,817	40,836	40,565	38,844	36,824
Hydropower Capacity/Total Capacity	32%	32%	33%	33%	33%	32%	33%	34%
Private Hydropower Generation Gwh	15,450	10,418	7,620	4,850	5,226	5,691	4,574	5,473
State Hydropower Generation Gwh	36,888	41,377	28,338	28,419	30,980	38,679	35,046	40,669
Total Hydropower Generatıon Gwh	52,339	51,796	35,958	33,270	36,206	44,370	39,620	46,142
Total Turkey Generation Gwh	229,395	211,208	194,813	198,418	191,558	176,300	161,956	150,698
Hydropower Generation/Total Generation	23%	25%	18%	17%	19%	25%	24%	31%

Table 21: Electricity generation and capacity of the hydropower plants[64]

Electric Utilities		Generation (Gwh) in 2011
EUAS	Thermal	36,636
	Hydro+Geothermal+Wind	36,888

[63] http://www2.epdk.org.tr/lisans/elektrik/ilerleme_proje.htm
[64] Tables 7-16-23-44 in http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/istatistik%202011.htm

	TOTAL	73,524
Affiliated Partnerships of Eüaş	Thermal	18,626
Mobile Power Plants	Thermal	0
	THERMAL	100,737
Production Comp.	Hydro+Geothermal+Wind	19,506
	TOTAL	120,243
Autoproducers+Toor	Thermal	15,439
	Hydro+Geothermal+Wind	1,362
	TOTAL	16,801
Turkey's Generation	Thermal	171,638
	Hydro+Geothermal+Wind	57,757
	TOTAL	229,395
Import		4,556
Export		3,645
Gross Demand		**230,306**

Table 22: Electricity generation in Turkey by producers[65]

Sub-step 4b- Discuss any similar Options that are occurring:
The rules suggested in EB 69 report, Annex 20 (the "Tool for the demonstration and assessment of additionality, Version 06.1.0") are followed and it is demonstrated in a stepwise approach that, Eğlence I-II HEPP is not "Common practice". Common Practice Analysis is applied to the operational projects in Turkish Electricity System as of end of 2011:

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

The installed capacity of the project is 68.65 MWe. Therefore, the lower limit of the applicable output range is 34.33 MW and upper limit is 102.98 MW.

Step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Registered CDM project activities shall not be included in this step:

The most up-to-date version of the TEIAS Capacity projection Report lists the power plant projects connected to Turkey's national electricity grid as of end of 2011.[66] As can be seen in the subject report, the number of all power plants that have the same capacity within the applicable range (between 34.33 MW and 102.98 MW), "Nall", is 70 .

[65] http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/uretim%20tuketim(22-45)/44.xls
[66] http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf

VER ?	Project	Installed Capacity (MW)	Company Type	Fuel
N	AKKÖY ENERJİ (AKKÖY HES)	101,9	Generation Company	Hydro
N	YAMULA	100	BOT	Hydro
N	AK ENERJİ (Çerkezköy)	98	Generation Company	Natural Gas
N	MODERN ENERJİ	96,8	Generation Company	Natural Gas
N	DİĞERLERİ (İzole)	96	Autoproducer	Fuel oil
N	KRALKIZI	94,5	EUAS	Hydro
N	ANTALYA ENERJİ	94,2	Generation Company	Natural Gas
N	KÖKLÜCE	90	EUAS	Hydro
N	ZORLU ENERJİ (Bursa)	90	Generation Company	Natural Gas
N	KÜRTÜN	85	EUAS	Hydro
N	TÜPRAŞ (İzmit-Yarımca)	85	Autoproducer	Fuel oil
N	DİĞERLERİ	84,1	Autoproducer	Natural Gas
N	ÇAMLICA (AYEN ENERJİ)	84	BOT	Hydro
N	KESİKKÖPRÜ	76	EUAS	Hydro
N	DOĞANKENT	74,5	EUAS	Hydro
N	ERDEMİR	73,5	Autoproducer	Fuel oil
N	SÖNMEZ ELEKTRİK	70,7	Generation Company	Natural Gas
N	KADINCIK I	70	EUAS	Hydro
N	MARMARA PAMUK	69,9	Autoproducer	Natural Gas
N	DEMİRKÖPRÜ	69	EUAS	Hydro
N	SUAT UĞURLU	69	EUAS	Hydro
N	ENERJİ-SA (Mersin)	64,5	Generation Company	Natural Gas
N	ÇEBİ ENERJİ	64,4	Generation Company	Natural Gas
N	ENERJİ-SA (Çanakkale)	64,1	Generation Company	Natural Gas
N	ADIGÜZEL	62	EUAS	Hydro
N	UĞUR ENERJİ (TEKİRDAĞ)	60,2	Generation Company	Natural Gas
N	DELTA ENERJİ	60	Generation Company	Natural Gas

N	EŞEN-I (GÖLTAŞ)	60	Generation Company	Hydro
N	SEYHAN I	60	EUAS	Hydro
N	AKSA AKRİLİK KİMYA (YALOVA)	59,5	Generation Company	Natural Gas
N	ESKİŞEHİR ENDÜSTRİ ENERJİ(OSB)	59	Generation Company	Natural Gas
N	TİRENDA TİRE	58,4	Generation Company	Natural Gas
N	DAREN HES (SEYRANTEPE BARAJI)	56,8	Generation Company	Hydro
N	DERBENT	56,4	EUAS	Hydro
N	CAN ENERJİ	56,3	Generation Company	Natural Gas
N	KADINCIK II	56	EUAS	Hydro
N	ODAŞ natural gas	55	Generation Company	Natural Gas
N	KAPULUKAYA	54	EUAS	Hydro
N	HG ENERJİ	52,4	Generation Company	Natural Gas
N	KOVADA-II(BATIÇİM EN.)	51,2	TOOR	Hydro
N	ŞANLI URFA	51	EUAS	Hydro
N	ZORLU ENERJİ (Sincan)	50,3	Generation Company	Natural Gas
N	HOPA	50	EUAS	Fuel oil
N	ÇERKEZKÖY ENERJİ	49,2	Generation Company	Natural Gas
N	GOREN-1 (GAZİANTEP ORG.SAN.)	48,7	Generation Company	Natural Gas
N	ENERJİ-SA BİRKAPILI	48,5	Generation Company	Hydro
N	KEMER	48	EUAS	Hydro
N	MANAVGAT	48	EUAS	Hydro
N	GÜRMAT EN.	47,4	Generation Company	Geothermal
N	BAYRAMHACILI (SENERJİ EN.)	47	Generation Company	Hydro
N	KARACAÖREN II	46,4	EUAS	Hydro
N	TÜPRAŞ (Orta Anadolu-Kırıkkale)	46	Autoproducer	Natural Gas
N	BATIÇİM ENERJİ (AK ENERJİ)	45	Generation Company	Natural Gas
N	DİĞERLERİ	45	EUAS	Hydro
N	ERENLER REG.(BME BİRLEŞİK EN.)	45	Generation Company	Hydro
N	SOMA A	44	EUAS	Lignite
N	TÜPRAŞ İZMİR (ALİAĞA RAF.)	44	Autoproducer	Fuel oil
N	KAREGE ARGES	43,7	Generation	Natural Gas

			Company	
N	EŞEN-II (GÖLTAŞ)	43,4	Generation Company	Hydro
N	KEN KİPAŞ (KAREN)ELEKTRİK	41,8	Generation Company	Natural Gas
N	AYEN OSTİM	41	Generation Company	Natural Gas
N	TEKTUĞ-ANDIRIN	40,5	Generation Company	Hydro
N	BEREKET (MENTAŞ)	39,9	Generation Company	Hydro
N	DİM HES (DİLER ELEK.)	38,3	Generation Company	Hydro
N	NUH ENERJİ 1 (Nuh Çimento)	38	Generation Company	Natural Gas
N	YENİCE	37,9	EUAS	Hydro
N	BEREKET (DALAMAN)	37,5	Generation Company	Hydro
N	BİL ENERJİ (Ankara)	36,6	Generation Company	Natural Gas
N	HABAŞ (İzmir)	36	Generation Company	Fuel oil
N	KARDEMİR	35	Autoproducer	Hard coal

Table 23: The list of Nall projects

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity (Ndiff):

When both the fuel types of the power plants and the company types are taken into account, the number of companies that apply technologies different that the technology applied in the proposed project activity (Ndiff):
Nsimilar= Nall-Ndiff

Ndiff= 70-11= 59

Step 4: Calculate factor representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity:

The factor F defined in the guideline is calculated with the formula below:

F = 1 – Ndiff/Nall

As a result, F = 1 – 59/70 = 0.16[67]

Nall – Ndiffer is 0.16 (less than “3”) and the factor F is lower than 0.2, Eğlence I-II HEPP is not “Common Practice”.

[67] Please see Common Practise Analysis exel sheet

The scarcity and the low completion rates of the projects in the Seyhan region and the factor F lower than 0.2 confirm that the electricity generation from HEPP business is not a common practice. Therefore Step 4 is satisfied.

Impact of VCS-VER income

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

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

The financial benefit from the revenue obtained by selling the CO2 emissions reductions has been one of the key issues encouraging investment in the proposed project activity.

2.6 Methodology Deviations

There are no methodology deviations.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

Baseline Emissions

Accordingly the baseline emissions BE_y are calculated as following:

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

Where:

BE_y	Baseline emissions (tCO2e)
EG_y	Annual electricity supplied by the project to the grid (MWh)
$EG_{baseline}$	Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero.
$EF_{grid, CM, y}$	Baseline emission factor (tCO2e/MWh)
Y	Refers to a given year

EG_y = 205,299MWh/year

$EG_{baseline}$ = 0 (The figure is zero for the project as the project is new)

Therefore, the expected baseline emission for the full year production of the project is:

BE_y = (0.5556-0) x 205,299 = 114,065 tCO_2e

3.2 Project Emissions

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

Where:

PE_y =	Project emissions in year y (tCO2e/yr)
$PE_{FF,y}$ =	Project emissions from fossil fuel consumption in year y (tCO2/yr)
$PE_{GP,y}$ =	Project emissions from the operation of geothermal power plants due to the release of Non-condensable gases in year y (tCO2e/yr)
$PE_{HP,y}$ =	Project emissions from water reservoirs of hydro power plants in year y (tCO2e/yr)

$PE_{FF,y}$ and $PE_{GP,y}$ are both irrelevant with the project activity and therefore assumed "0", as the proposed project activity is a new grid-connected run-off-river hydro power plant.

On the other hand, ACM0002 Version 13 0.0 suggests that project proponents shall account for CH_4 and CO_2 emissions for the reservoir. Although the project does not have a reservoir and result in only a small lake which is attached to the regulator of the facility, the proposed calculations were run to prove the fact that the project's emissions can be assumed "0".

The Project emissions are calculated with the formula mentioned in ACM0002 / Version13 0.0 as:

$$PE_{HP,y} = \frac{EF_{Res} \cdot TEG_y}{1000}$$

Where:

$PE_{HP,y}$ =	Emission from reservoir expressed as tCO2e/year
EF_{Res} =	Default emission factor for emissions from reservoirs of hydro power plants in year y (CO_2e /MWh)
TEG_y =	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y (MWh).

However, again according to ACM0002 / Version 13 0.0 if the power density (PD) of the hydro power plant is above 10 W / m^2 , PEy is 0.

The power density of the project activity is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD =	Power density of the project activity, in W/m^2
CapPJ =	Installed capacity of the hydro power plant after the implementation of the project Activity (W)
CapBL =	Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero

APJ = 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)
ABL = 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). For new reservoirs, this value is zero

Power density calculation for Eğlence-I HEPP:

CapPJ = 42,650,000W
CapBL = 0 (Justification: The project is a new hydro power plant)
APJ = 87,216.410 m^2 (Justification: The project does not include a reservoir)
ABL = 0 (Justification: The project is a new hydro power plant))

Therefore;

PD = (42,650,000 – 0) /(87,216.410– 0) = 489.0 W/m^2

Power density calculation for Eğlence-II HEPP:

CapPJ = 26,000,000W
CapBL = 0 (Justification: The project is a new hydro power plant)
APJ = 10,491.275 m^2 (Justification: The project does not include a reservoir)
ABL = 0 (Justification: The project is a new hydro power plant))

Therefore;

PD = (26,000,000 – 0) /(10,491.275– 0) = 2,478.2 W/m^2

Since the Power Density of the Eğlence-I and Eğlence-II HEPP is greater than 10 W/m^2 PE_y and LE_y are assumed to be 0 as suggested in ACM0002 / Version 13 0.0.

3.3 Leakage

The project emissions are calculated according to the formula (1) in ACM0002 / Version 13 0.0. In order to calculate the project emissions from the reservoir, first, the power density of the project is calculated by using the formula (5) in the tool. Since the power density of the project is greater than 10 W/m2, project emissions from reservoir ($PE_{HP,y}$) is accepted as "0", as it is indicated in the formula (4) of the tool. Also, as suggested in ACM0002 / Version 13 0.0, the leakage emissions are not calculated and accepted as "0". Last, baseline emissions are calculated by multiplying annual electricity generation of the project with the grid emission factor (formula 6), as suggested by ACM0002 / Version 13 0.0. Last, the emission reductions are calculated by deducting project emissions from baseline emissions (formula 11 in ACM0002/Version 13 0.0). Since there are no project emissions in this project, emission reductions are equal to baseline emissions.

3.4 Summary of GHG Emission Reductions and Removals

Total installed capacity of the project	68.65 MWe
Net electricity delivered to the grid (EG_y)	205,299 MWh
Baseline emission factor (Combined Margin) of Turkish grid (EF_y) EFy = w_{OM} x $EF_{OM,y}$ + W_{BM} x $EF_{BM,y}$	0.5 x 0.6613 + 0.5 x 0.4499 = 0.5556 tCO_2e/MWh
Baseline emissions (BEy)	205,299 x 0.5556 = 114,065 tCO_2e/year
Project emissions (PE_y)	0 tCO_2e/year
Leakage emissions (LE_y)	0 tCO_2e/year
Emission reduction (ER_y)	114,065tCO_2e/year

Years	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions(tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
2013	70,415	0	0	70,415
2014	114,065	0	0	114,065
2015	114,065	0	0	114,065
2016	114,065	0	0	114,065
2017	114,065	0	0	114,065
2018	114,065	0	0	114,065
2019	114,065	0	0	114,065
2020	114,065	0	0	114,065
2021	114,065	0	0	114,065
2022	114,065	0	0	114,065
2023	30,938			30,938
Total	1,127,938	0	0	1,127,938

Table 24: Summary of GHG Emission reductions and removals

4 MONITORING

4.1 Data and Parameters Available at Validation

Data Unit / Parameter:	**$FC_{i,y}$**
Data unit:	Ton (m^3 for Natural Gas)
Description:	Amount of fossil fuel type *i* consumed in the project electricity system in year *y*

Source of data:	Turkish Electricity Transmission Company (TEIAS) http://www.teias.gov.tr/istatistik2008/43.xls http://www.teias.gov.tr/istatistik2008/44.xls
Value applied:	Please see Section 2.3
Justification of choice of data or description of measurement methods and procedures applied:	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, providing the most up-to-date and accurate information available.
Any comment:	

Data Unit / Parameter:	**NCV**
Data unit:	TJ/Ton (TJ/m^3 for Natural Gas)
Description:	Net calorific value of fossil fuel type
Source of data:	Turkish Electricity Transmission Company (TEIAS) http://www.teias.gov.tr/istatistik2008/45.xls http://www.teias.gov.tr/istatistik2008/46.xls
Value applied:	Please see Section 2.3
Justification of choice of data or description of measurement methods and procedures applied:	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, providing the most up-to-date and accurate information available.
Any comment:	The conversion factor of 4.187 Joules/Cal is used.

Data Unit / Parameter:	**$EFCO_2$,i, y**
Data unit:	tCO2/GJ
Description:	Default CO2 emission factor of fossil fuel type i
Source of data:	IPCC default values (as provided in Table 1.4, Chapter 1, Volume 2 (Energy), 2006 IPCC) Guidelines for National Greenhouse Gas Inventory) are used. Link: http://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied:	Please see **Annex 3**
Justification of choice of data or description of measurement methods and procedures applied:	There is no information on the fuel specific default emission factor in Turkey. Hence, IPCC values haves been used as per the "Tool to calculate the emission factor for an electricity system (version 02.01.0)".
Any comment:	

Data Unit / Parameter:	**Electricity Imports**

Data unit:	GWh
Description:	Electricity imported to the Grid from other countries
Source of data:	Turkish Electricity Transmission Company (TEIAS) http://www.teias.gov.tr/istatistik2008/23.xls
Value applied:	Please refer to the link above for Turkey's electricity imports.
Justification of choice of data or description of measurement methods and procedures applied:	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, hence providing the most up-to-date and accurate information available.
Any comment:	

Data Unit / Parameter:	**Capacity additions**
Data unit:	Name of the plant; Installed capacity (MW); Fuel type; Commissioning date.
Description:	Set of power capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently.
Source of data:	Turkish Electricity Transmission Company (TEIAS) Generation units put into operation in 2004, 2005, 2006, 2007 and 2008. The Annex 2 of TEIAS Capacity Projection Reports for years 2008, 2007, 2006, 2005 and 2004 are applied for the capacity additions: *http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202005.pdf* for year 2004. *http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202006.pdf* for year 2005. *http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202007.pdf* for year 2006 *http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2008.pdf* for year 2007 *http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf* for year 2008
Value applied:	Please refer to **Section 2.4** for Capacity Additions
Justification of choice of data or description of measurement methods and procedures applied:	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, hence providing the most up-to-date and accurate information available.
Any comment:	

4.2 Data and Parameters Monitored

Data Unit / Parameter:	**EGfacility,y**
Data unit:	MWh
Description:	Quantity of net electricity delivered to the grid in year y.
Source of data:	PMUM (Market Financial Settlement Center) records
Description of measurement methods and procedures to be applied:	The produced and consumed electricity is continuously measured by the main and check meters attached to the power plant. This continuous measurement is recorded in a monthly basis.
Frequency of monitoring/recording:	Continuous measurement and at least monthly recording
Value applied:	205,299 MWh/year
Monitoring equipment:	Electric meters
QA/QC procedures to be applied:	Cross check measurements results with records for sold electricity. Calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately.
Calculation method:	EGFacility,y= EGexport,y- EGimport,y
Any comment:	N/A

Data Unit / Parameter:	**CapPJ**
Data unit:	MW
Description:	Installed capacity of the Eğlence-I hydro power plant after the implementation of the project activity
Source of data:	Project site
Description of measurement methods and procedures to be applied:	Supplier information on the equipment
Frequency of monitoring/recording:	Yearly
Value applied:	42.65 MW
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Supplier information on the related equipment and existence of the equipment will be checked

Calculation method:	
Any comment:	N/A

Data Unit / Parameter:	**CapPJ**
Data unit:	MW
Description:	Installed capacity of the Eğlence-II hydro power plant after the implementation of the project activity
Source of data:	Project site
Description of measurement methods and procedures to be applied:	Supplier information on the equipment
Frequency of monitoring/recording:	Yearly
Value applied:	26.00 MW
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Supplier information on the related equipment and existence of the equipment will be checked
Calculation method:	
Any comment:	N/A

Data Unit / Parameter:	**APJ**
Data unit:	m2
Description:	Area of the reservoir measured in the surface of the water for Eğlence-I HEPP, after the implementation of the project activity, when the reservoir if full
Source of data:	Project site
Description of measurement methods and procedures to be applied:	Topographical surveys, GPS readings
Frequency of monitoring/recording:	Yearly
Value applied:	87,216.410 m^2
Monitoring equipment:	
QA/QC procedures to be applied:	The readings will be done during the period when the water flow is high to have the largest reservoir area
Calculation method:	
Any comment:	N/A
Data Unit / Parameter:	**APJ**

Data unit:	m2
Description:	Area of the reservoir measured in the surface of the water for Eğlence-II HEPP, after the implementation of the project activity, when the reservoir if full
Source of data:	Project site
Description of measurement methods and procedures to be applied:	Topographical surveys, GPS readings
Frequency of monitoring/recording:	Yearly
Value applied:	10491.275 m^2
Monitoring equipment:	
QA/QC procedures to be applied:	The readings will be done during the period when the water flow is high to have the largest reservoir area
Calculation method:	
Any comment:	N/A

4.3 Description of the Monitoring Plan

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

The project is operated by Egenda Ege Enerji Uretim A.S. which ensures the overall site management in accordance with Turkish Laws and technology providers' guidelines.

The approved baseline and monitoring methodology ACM0002-Version 13 0.0*:* "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" ("ACM0002") is applied[68].

Data	**Uncertainty Level of Data (High/ Medium / Low)**	**Explain QA/ QC Procedures Planned for this Data or why such procedures are not necessary**
Quantity of net electrcity delivered to the grid	Low	The metering equipment will be properly calibrated and checked

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

		periodically for accuracy, to ensure that any error resulting from such equipment shall not exceed +0.2% of full scale rating. Rules form meter accuracy are stated in the TEIAS connection agreement. In addition to the main meter, a redundant meter will be installed to exclude the possibility of data loss.
Installed capacity of the Project after the implementation	Low	The installed capacity of the Project is equal to the total installed capacities of the equipment implemented at the beginning of the project's life. The installed capacity will be monitored from supplier's documents related to the equipment.
Area of the reservoir measured in the surface of the water, after the implementation of the Project activity, when the reservoir is full.	Low	The measuring will be done through either topographical survey or GPS readings. In either ways, sample coordinates from the reservoir border will be read. Then , these data will be used to calculate the reservoir surface area.

Table 25: Quality Control of Monitoring

Each monitoring period is planned to last one year. At the end of each period, the installed capacity will be checked from the information provided by the company and onsite visits and all production figures which are subject to sales to the grid are agreed with PMUM (Market Financial Reconciliation Centre). These figures can be accesses from PMUM's web site by the seller. Therefore, net electricity production figures[69] announced by PMUM will be used in emission calculation figures. These figures will also be cross checked with the production and internal electricity usage figures.
The total amount of the net electricity generation of that period will then be multiplied with the combined emission factor. An excel sheet that also includes the estimation of the combined emission factor will be used to calculate the amount of ERs through the multiplication of net electricity generated and combined emission factor. Thus, a transparent and traceable baseline approach and ER calculation will be provided. For quality assurance and follow-up, GAIA Carbon Finance will be present at each monitoring assembly. The kwh invoice from EGENDA EGE ELEKTRIK DAGITIM SAN. VE TIC.A.S. to the purchasers will be cross-checked with metering as well.

The monitoring will be performed in-house by the project proponent:
1. *Electrical Engineers* will undertake the specific actions required by the monitoring plan, i.e. they will measure the electricity generation, the electricity supplied to the Turkish grid by the power plant, the electricity imports and the amount of fuel consumed, if fuel is consumed.
2. *Mechanical Engineers* will ensure that all the instrumentations and devices to perform the monitoring are working properly.

[69] Net electricity production figure = Electricity generation (operation base) – Electricity traction from grid

3. *Accounting Manager* will be in charge of providing the electricity sales receipts to the Operations Manager of the plant.
4. *Operations Manager* will be the VER coordinator. He will be in charge of:
   a) Ensuring that instrumentations and devices are available and properly suited to perform efficiently the monitoring.
   b) Communicating and coordinating the monitoring tasks of all business units.
   c) Developing, executing, analyzing and improving the VER Monitoring/Reporting Procedures. This includes the crosschecking and consolidation (with multiple sources whenever possible) of the data obtained from the electrical engineers and the accounting manager. He will also record this operation properly to be able to provide it to the DOE during the verification process.
   d) Calculating and report the emission reductions, and
   e) Organizing in-house seminars to inform and train the company staff to the monitoring procedures.

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

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

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

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

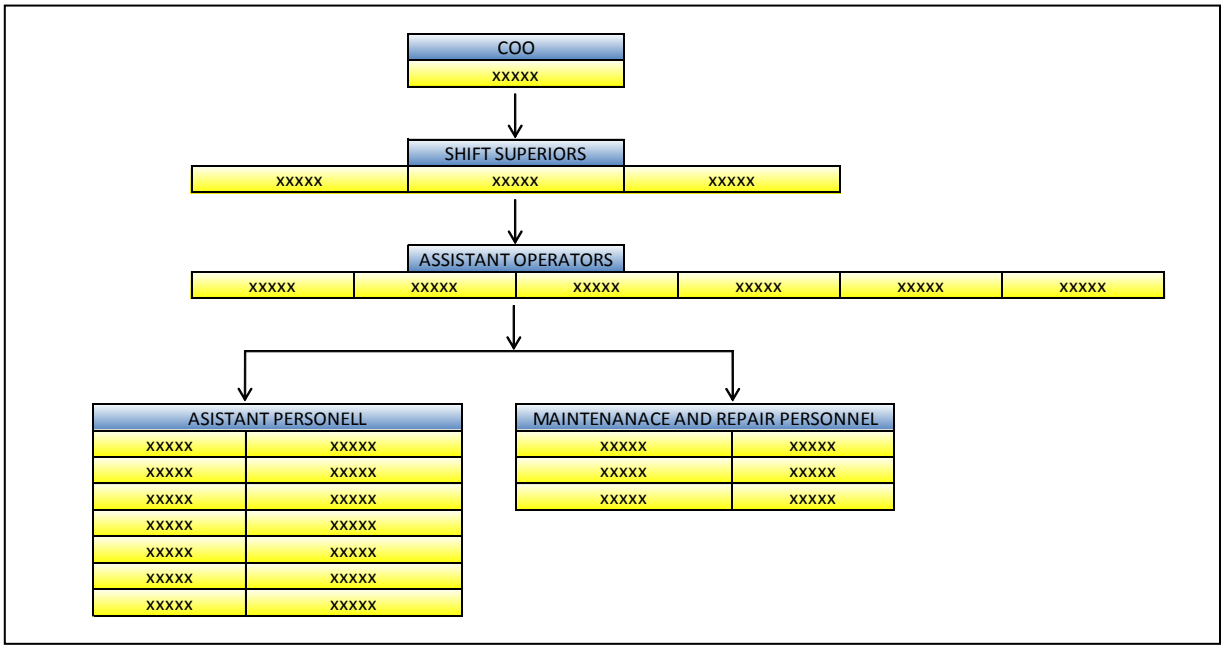


Figure 10: Site Organizational Chart

Measuring

All relevant baseline emission factors are defined ex-ante. Please see the baseline estimations - Section 3.1 - for Operating and Build Margin estimations. Hence, there are three sets of data to be monitored during the project activity.

The first one is the amount of electricity fed into the grid. There will be two meters attached to the power plant for measurement of the generated electricity. One of the meters is main meter and the other is control meter. The role of the second meter is to check if the main meter measures the generated electricity accurately. The periodical check for the meters is 1 year as stated in Article 3.3 of the TEIAS System Usage Agreement. If there is a measuring difference between these two meters and one of the parties (TEIAS or the company) requests for calibration of the meters, in this case, the meters will be calibrated (TEIAS System Usage Agreement, Art 3, B./2./b)[70] without waiting for the periodical check. This calibration process is done by another third party under the control of TEIAS. The company is not responsible for calibration of the meters in Turkey according to the local standards. In all calculations, the main meter's measurements are used. The generated electricity will be measured continuously and reported in a monthly basis. The plant manager of Eglence HEPP will be responsible for providing the measurement records which show the monthly electricity generation of the company. The quantity of net electricity delivered to the grid will be also cross checked with the production and internal electricity usage figures provided from the " Monthly Meter Reading Protocols" . The project developer is not responsible for the transmission losses; therefore transmission losses are not included. During the each monitoring period, PMUM records and Monthly Meter Reading Protocols will be presented to the DOE, together with the calculation details.

[70] http://eud.teias.gov.tr/SKAM/SKAornek.pdf

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

The second data to be monitored is the installed capacity of the project activity. The installed capacity only changes if the project design is changed. If there are any changes regarding the installed capacity of the project, EMRA has to be informed about this change. The company will report the installed capacity changes in each monitoring period, if there is any and this information will be checked from EMRA website. The plant manager will be responsible to provide the data.

The data will be collected and stored by Enda Enerji not only during the crediting period but also two years after the last issuance of VCS VERs to Eglence HEPP project for that crediting period.

The third data to be monitored is the reservoir area. The reservoir area will be calculated by a computer program which will be processed wih the drawings received from the project design company as a result of the topographical surveys. The possible maximum surface area of the reservoir will be calculated.

The plant management of EGENDA is responsible with all monitoring and reporting issues in general.

5 ENVIRONMENTAL IMPACT

The revised version of the Turkish Environmental Law, enacted on 26th April 2006, Law No. 5491 was passed; revising, modernizing and expanding the Environmental Law. While keeping the general outline and spirit of the original law, the Revised Environmental Law is more specific on various issues and embraces a more modern perspective regarding environmental issues, with a view to draw level with EU legislation.
The Revised Environmental Law introduces two principles as the main purpose of this law, namely a sustainable environment and sustainable development. The sustainable environment principle is defined as the *"improvement, protection, and development of all environmental assets that constitute the environment of the present and future generation in every (social, economical, physical, etc.) way without endangering the existence and quality of the resources that will be needed by future generations."* Similarly, the sustainable development principle is defined as the *"development and growth based on the principle of establishing balance between the environmental, economical, and social targets, which ensure that future generations shall live in a healthy environment."*

The expansion of the Revised Environmental Law's definition section is noteworthy, not only due to its inclusion of these two core principles, but also due to its definitive coverage of various concepts and entities new to the Turkish environmental legislation, such as 'biological diversity', 'ecological balance', 'sensitive lands', 'environmental management' and 'non-ionizing radiation'.

According to the Turkish law, a comprehensive EIA report is required to the projects which have a 25 MW or more of installed capacity[71]. By its dimension, Eglence I-II falls under the EIA requirement zone. Hence, an EIA report has been carried out and it has concluded that the project activity will not lead to significant negative impacts. Furthermore, it will contribute to improve the environmental situation in the region and in the country. Avoiding fossil fuel-based electricity will enhance the air quality and help

[71] Turkish Environmental Impact Assessment Regulation entered into force on 17.07.2008 and the latest revision was published in Official Gazette N° 26939 dated17.07.2008.

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

The EIA report did not only assess the environmental impacts but it also presented a monitoring plan to be implemented during construction and operation phases. Monitoring Forms will be prepared and presented to the Ministry within periods of three months.

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

Possible impacts during the construction activities

According to the environmental impact studies, the implementation of the project activity is not considered to be present any significant risk for human health or the environment.

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

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

To minimize the possible work accidents, qualified personnel will be hired and will be continuously trained for work safety. Also, the personnel will be equipped with personnel protection equipments required by Turkish Labour Safety Regulations [72] and appropriate healthcare and labour safety conditions will be provided.

As stated in the EIA Report, all necessary precautions, determined by the regulation, "The controlling of the Excavation Soil and the Construction Waste" [73] will be taken during the excavation and construction of the project. In addition, it is stated that the regulation, "The Storage and Usage of the Explosives" will be firmly complied throughout the construction phase.[74]

Turkish law prohibits the direct or indirect release, storage, transportation and dislodgement of any type of waste or residue in a manner that may harm the environment. Entities falling within the scope of the relevant prohibitions, are obligated to take preventive measures if there is a possibility of pollution; to stop pollution; and to lessen or restore its impact on the environment if pollution has taken place.

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

Impacts on the landscape
In order to prevent erosion in the slopes and to form a security band, reforestation works will be carried out under the control of the Environment and Forestry Directorate and Operational Directorates. The species that will be used are local species. The soil excavated for the construction will be placed back and reforestation works will be realized taking into consideration of the natural vegetation of the region.

Noise impacts

[72] The Official Gazette dated 09.12.2003, Ratification No: 25311
[73] The Official Gazette dated 18.03.2005, Ratification No: 25406
[74] The Official Gazette dated 24.12.1973, Ratification No: 14752

The noise will be negligible as the Eglence I-II HEPP will be constructed with compliance to the 23rd clause of the regulation named as "The Assessment and the Management of the Environmental Noise" Therefore, to decrease the effect of noise, several measures will be taken. Floor tile having vibration and sound absorbent property will be used in power station building. Also, the noise impacts from the studies on the surface will be minimized by limiting the activities to the daytime and by warning the local residents. In addition, noise measurements will be conducted during specified periods in order to determine possible turbine and generator noise levels.

6 STAKEHOLDER COMMENTS

Since the project is developed under VCS, the project developer was not held responsible for the organisation of a local stakeholder consultation meeting. The stakeholder meeting was organised by the Ministry of Environment and Forestry and the whole process was conducted independently from the project developer. As a part of the Environmental Impact Assessment of Eglence I-II project, in line with the article 9 of EIA Regulation, in order to incorporate stakeholders into the EIA process, apply for their comments about the project a community two community meetings were organised. The first meeting which is organised for Eglence I was held on November 24th, 2009 in Etekli Village Coffeehouse, Karaisali, Adana. The second meeting was organised for the Eglence II part of the project on November 25th, 2009 in Boztahta village Coffeehouse, Karaisali, Adana. Newspaper advertisements were published on a local and a national gazette to reach more people. Please see the newspaper invitations below:

DUYURU

Adana İli, Karaisalı İlçesi, Eğlence Çayı üzerinde, Posyağbasan Köyü ile Küp mahallesi arasında, Egenda Ege Enerji Üretim A.Ş. Tarafından yapılması planlanan Eğlence I Regülatörü ve Hidroelektrik Santrali Projesi ile ilgili ÇED Yönetmeliği gereği halkı bilgilendirmek amacıyla aşağıda belirtilen tarih,saat ve yerde Halkın Katılımı Toplantısı düzenlenecektir. Duyurulur.

Tarih: 24.11.2009
Saat: 11:00
Yer: Karaisalı, Etekli Köyü, Etekli Köy Kahvesinde

Milliyet Gazetesi 12.11.2009

DUYURU

Adana İli, Karaisalı İlçesi, Eğlence Çayı üzerinde, Posyağbasan Köyü ile Küp mahallesi arasında, Egenda Ege Enerji Üretim A.Ş. Tarafından yapılması planlanan Eğlence I Regülatörü ve Hidroelektrik Santrali Projesi ile ilgili ÇED Yönetmeliği gereği halkı bilgilendirmek amacıyla aşağıda belirtilen tarih,saat ve yerde Halkın Katılımı Toplantısı düzenlenecektir. Duyurulur.

Tarih: 24.11.2009
Saat: 11:00
Yer: Karaisalı, Etekli Köyü, Etekli Köy Kahvesinde

Yeni Adana Gazetesi 12.11.2009

DUYURU

Adana İli, Karaisalı İlçesi, Eğlence Çayı üzerinde, Boztahta Köyü, Köpekli Mahallesi Mevkiinde, Egenda Ege Enerji Üretim A.Ş. Tarafından yapılması planlanan Eğlence II Regülatörü ve Hidroelektrik Santrali Projesi ile ilgili ÇED Yönetmeliği gereği halkı bilgilendirmek amacıyla aşağıda belirtilen tarih, saat ve yerde Halkın Katılımı Toplantısı düzenlenecektir. Duyurulur.

Tarih: 25.11.2009
Saat: 11:00
Yer: Karaisalı, Boztahta Köyü, Boztahta Köy Kahvesinde

Milliyet Gazetesi 12.11.2009

DUYURU

Adana İli, Karaisalı İlçesi, Eğlence Çayı üzerinde, Boztahta Köyü, Köpekli Mahallesi Mevkiinde, Egenda Ege Enerji Üretim A.Ş. Tarafından yapılması planlanan Eğlence II Regülatörü ve Hidroelektrik Santrali Projesi ile ilgili ÇED Yönetmeliği gereği halkı bilgilendirmek amacıyla aşağıda belirtilen tarih, saat ve yerde Halkın Katılımı Toplantısı düzenlenecektir. Duyurulur.

Tarih: 25.11.2009
Saat: 11:00
Yer: Karaisalı, Boztahta Köyü, Boztahta Köy Kahvesinde

Yeni Adana Gazetesi 12.11.2009

Figure 9: The newspaper advertisements published on Milliyet and Yeni Adana Gazettes to invite stakeholders to the community meetings organised for Eglence I-II HEPP

Both of the stakeholders' meetings were held with wide participation of the Regional Directorate of Forestry and Environment of Adana province, Provincial Directorate of Agriculture of Adana, The 6th Area Director of State Water Works of Adana province, Egenda Ege Enerji Uretim A.S., ARUV CEVRE

Mühendislik Müsavirlik Hizmetleri San. ve Tic. Ltd., the mukhtars of the related villages and the villagers.

Figures 10-11: Scenes from the Stakeholder meeting

The stakeholders' meetings were comprised of the presentation of information about

- The duration of the construction, cost of the project,
- General information about the construction site,
- The technical information about the units and equipments to be used at the project,
- The potential environmental impacts and measures that will be taken,
- The project developer's aim that the personnel and machinery required will be provided from regional sources.

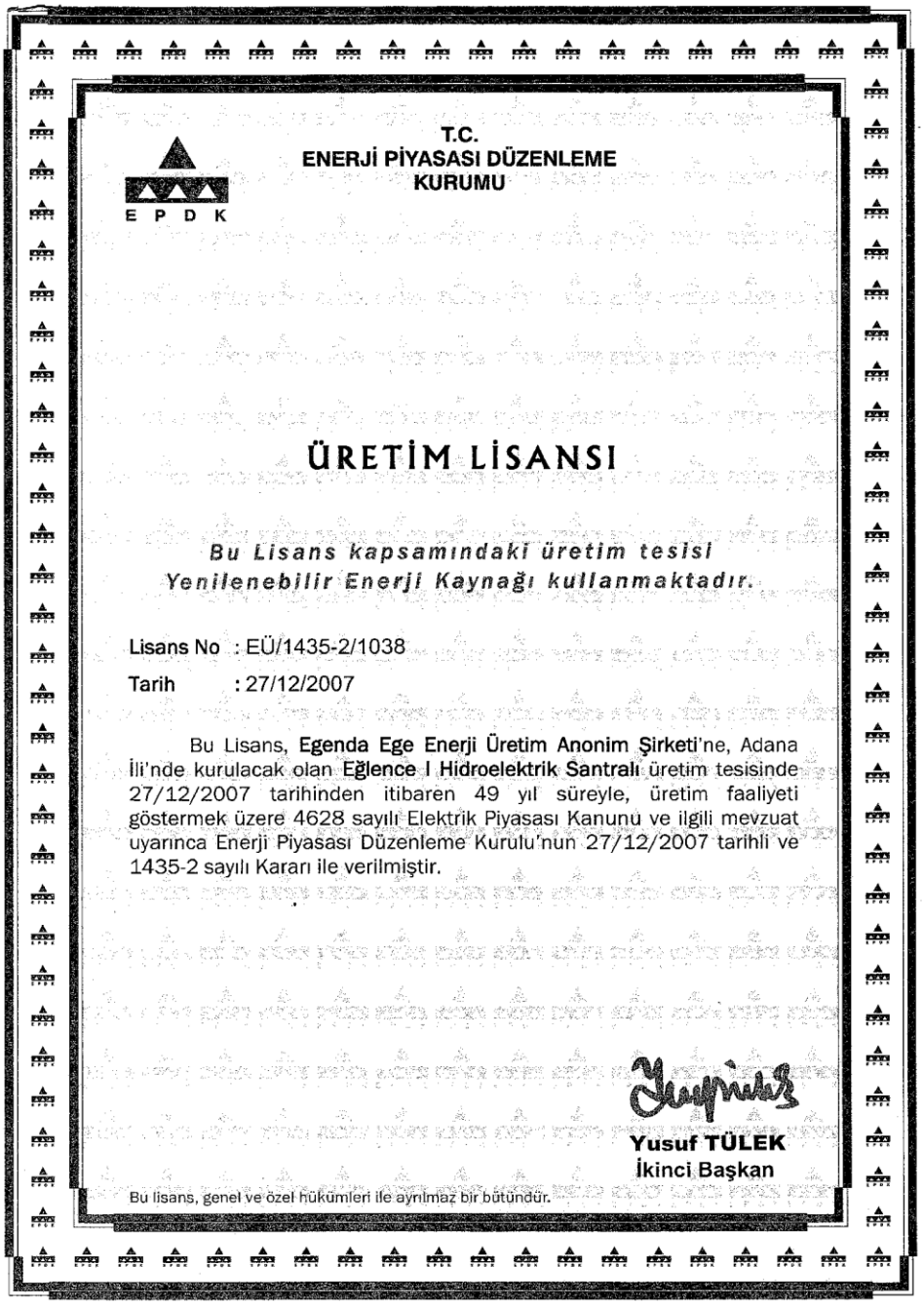
At the end of both meetings, all stakeholders were content that environment-friendly energy production was going to be realized, meaning that the project does neither consume nor contaminate the Eglence river. In addition, it was stated that a reservoir area of negligible size would come into existence and the project would not cause any negative impacts to the underground water. and no negative impacts for the flora and the fauna as well as the inhabitants were going to be experienced.[75]

In addition to the information above, a record book has been provided in order to monitor the on-going communication mechanism. The record book entails four basic information; stakeholders' personal info, stakeholder request, project developer's response to the request and how the request is closed. The record book has been placed to a location where it is easily reached by the stakeholders. By means of the record book, the continuous monitoring of the project activity throughout the crediting period shall be realised.

[75] Please see Section IX. of Eglence I and Eglence II. EIA Reports.

ANNEX 1

The documents below explain that these licenses is provided to Egenda Ege Enerji Uretim A.S. for Eglence I-II project which is planned to be installed in Adana province, in accordance with Energy Market Law and the Decision of Energy Market Regulatory Authority (Date: 27.12.2007, Number: 1435-2 and Number: 1435-3)



T.C.
ENERJİ PİYASASI DÜZENLEME KURUMU

E P D K

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi Yenilenebilir Enerji Kaynağı kullanmaktadır.

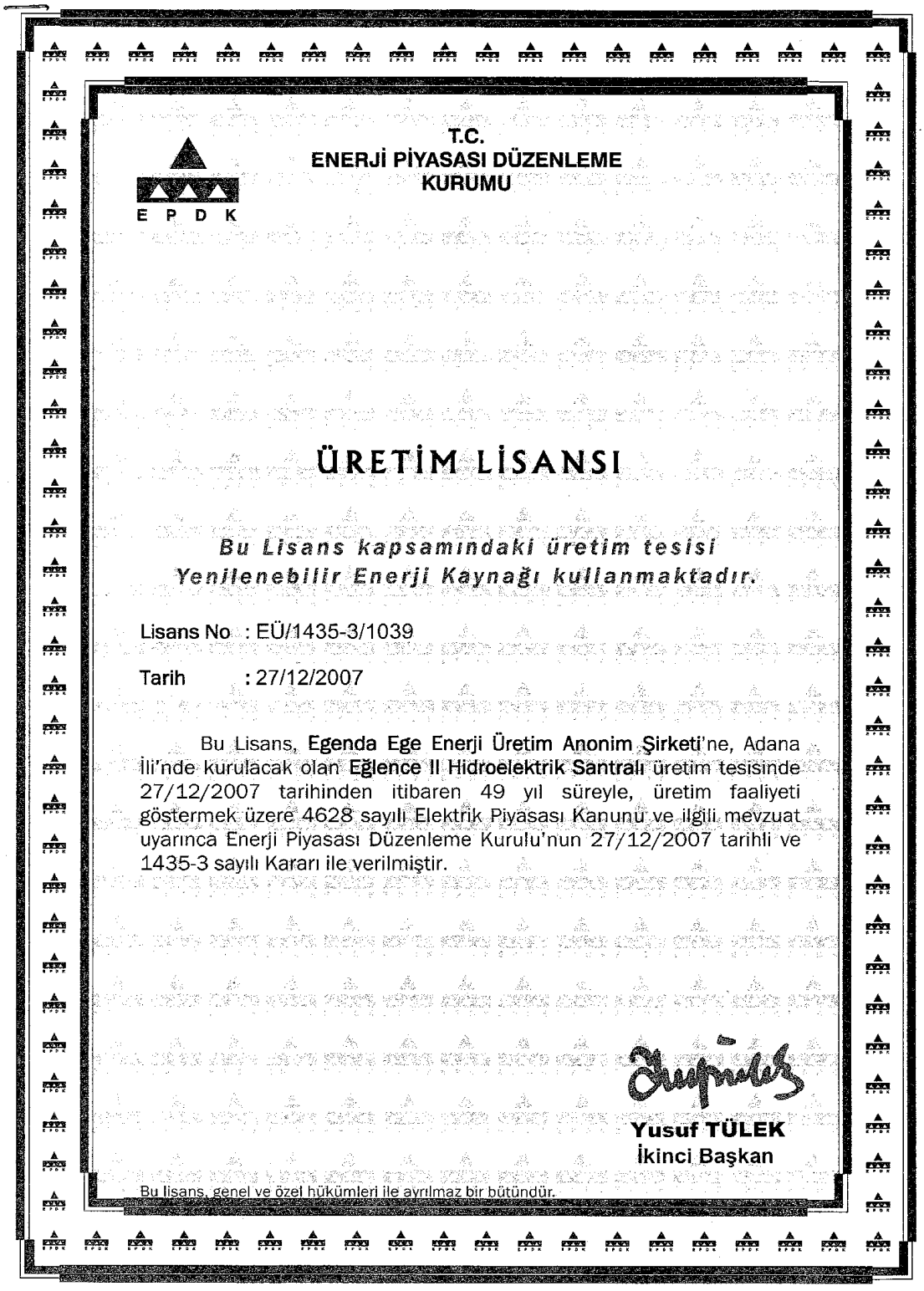
Lisans No : EÜ/1435-2/1038

Tarih : 27/12/2007

Bu Lisans, **Egenda Ege Enerji Üretim Anonim Şirketi**'ne, Adana İli'nde kurulacak olan **Eğlence I Hidroelektrik Santralı** üretim tesisinde 27/12/2007 tarihinden itibaren 49 yıl süreyle, üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 27/12/2007 tarihli ve 1435-2 sayılı Kararı ile verilmiştir.

Yusuf TÜLEK
İkinci Başkan

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



T.C.
ENERJİ PİYASASI DÜZENLEME KURUMU

E P D K

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi Yenilenebilir Enerji Kaynağı kullanmaktadır.

Lisans No : EÜ/1435-3/1039

Tarih : 27/12/2007

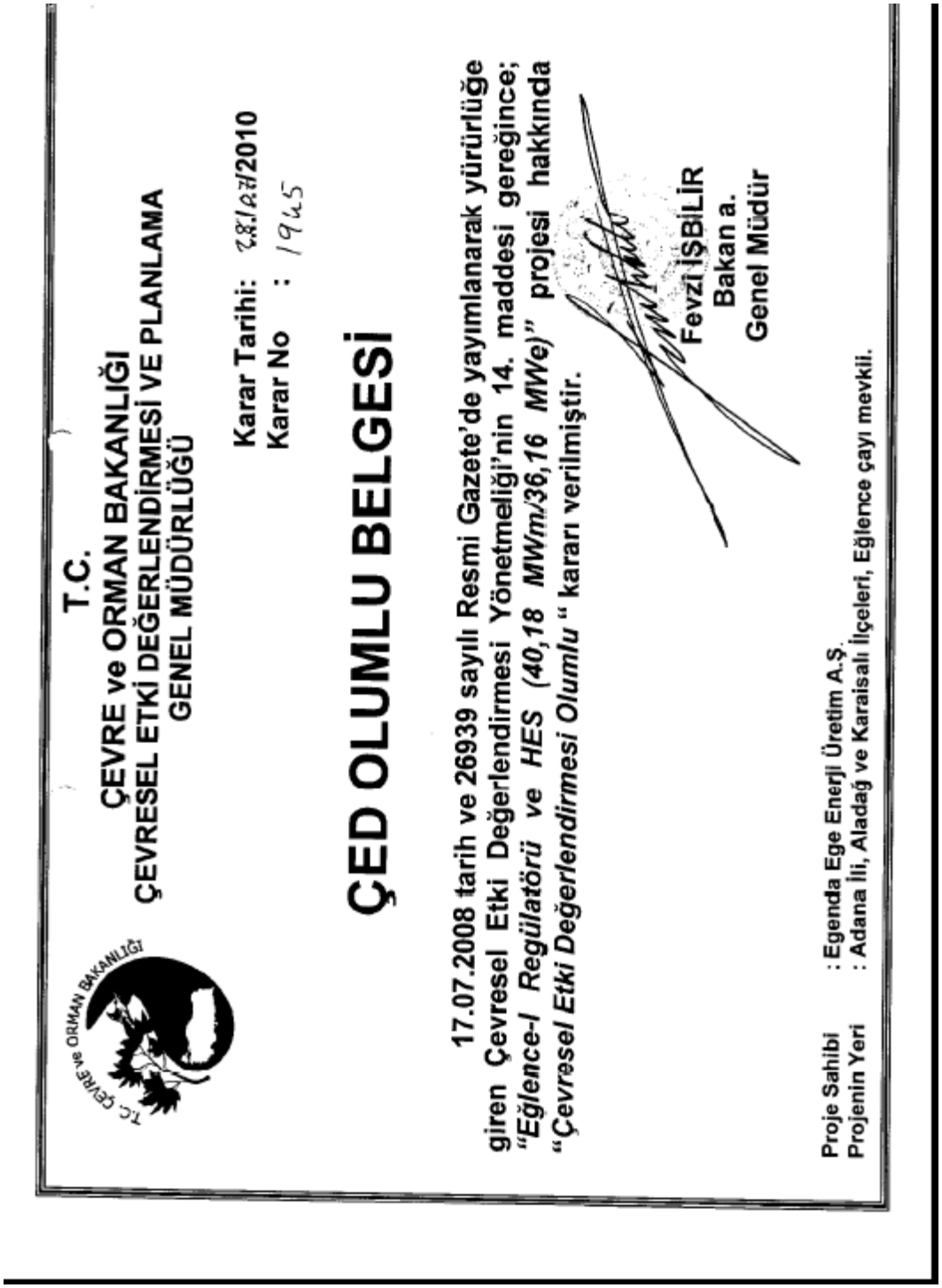
Bu Lisans, **Egenda Ege Enerji Üretim Anonim Şirketi**'ne, Adana İli'nde kurulacak olan **Eğlence II Hidroelektrik Santralı** üretim tesisinde 27/12/2007 tarihinden itibaren 49 yıl süreyle, üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 27/12/2007 tarihli ve 1435-3 sayılı Kararı ile verilmiştir.

Yusuf TÜLEK
İkinci Başkan

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

ANNEX 2

EIA Positive Reports of the Project.



T.C.
ÇEVRE ve ORMAN BAKANLIĞI
ÇEVRESEL ETKİ DEĞERLENDİRMESİ VE PLANLAMA
GENEL MÜDÜRLÜĞÜ

Karar Tarihi: 28/07/2010
Karar No : 1945

ÇED OLUMLU BELGESİ

17.07.2008 tarih ve 26939 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği'nin 14. maddesi gereğince; *"Eğlence-I Regülatörü ve HES (40,18 MWm/36,16 MWe)"* projesi hakkında *"Çevresel Etki Değerlendirmesi Olumlu"* kararı verilmiştir.

Fevzi İŞBİLİR
Bakan a.
Genel Müdür

Proje Sahibi : Egenda Ege Enerji Üretim A.Ş.
Projenin Yeri : Adana İli, Aladağ ve Karaisalı İlçeleri, Eğlence çayı mevkii.

T.C.
ÇEVRE ve ORMAN BAKANLIĞI
ÇEVRESEL ETKİ DEĞERLENDİRMESİ VE PLANLAMA
GENEL MÜDÜRLÜĞÜ

T.C. ÇEVRE ve ORMAN BAKANLIĞI

Karar Tarihi: 30/07/2010
Karar No : 1950

ÇED OLUMLU BELGESİ

17.07.2008 tarih ve 26939 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği'nin 14. maddesi gereğince; *"Eğlence II Reg. ve HES " (30,11 MWm/27,10 MWe)* projesi hakkında *" Çevresel Etki Değerlendirmesi Olumlu"* kararı verilmiştir.

Fevzi İŞBİLİR
Bakan a.
Genel Müdür

Proje Sahibi : Egenda Ege Enerji Üretim A.Ş.
Projenin Yeri : Adana İli, Karaisalı İlçesi, Eğlence Çayı Mevkii, Eğlence Çayı üzerinde

ANNEX 3

Water Usage Agreement

№ 41642

EĞLENCE I HİDROELEKTRİK ENERJİ ÜRETİM TESİSİNİN SU KULLANIMI HAKKI VE İŞLETME ESASLARINA İLİŞKİN ANLAŞMA

Anlaşmanın konusu ve taraflar

Madde 1- "Elektriğin yeterli, kaliteli, sürekli, düşük maliyetli ve çevreye uyumlu bir şekilde tüketicinin kullanımına sunulması için rekabet ortamında özel hukuk hükümlerine göre faaliyet gösterebilecek, mali açıdan güçlü, istikrarlı ve şeffaf bir elektrik enerjisi piyasasının oluşturulması ve bu piyasada bağımsız bir düzenleme ve denetimin sağlanması" amacını taşıyan 4628 sayılı Elektrik Piyasası Kanunu hükümleri çerçevesinde halen piyasada faaliyet gösteren veya gösterecek tüzel kişiler tarafından hidroelektrik enerji üretim tesisleri kurulması ve işletilmesine ilişkin üretim, otoprodüktör, otoprodüktör grubu lisanslarına yönelik düzenlenen işbu Su Kullanım Hakkı Anlaşması Eğlence I HES üretim tesisi için üretim lisansı verilmesi 14.06.2007 tarihli ve 1224/8 sayılı EPDK Kurul Kararı ile uygun bulunması nedeniyle, Devlet Su İşleri Genel Müdürlüğü ile Egenda Ege Enerji Üretim Anonim Şirketi arasında akdedilmiştir.

T.C. ANKARA 35. NOTERLİĞİ Necatibey Cad. No:92 / 2 Bahçelievler Tel: 220 72 45 - 220 72 46 ANKARA
27 Kasım 2007
Harç, D. Vergisi B.K. Bedeli Nakden tahsil edilmiştir.

Tanımlar

Madde 2- Anlaşmada adı geçen:

1. Bakanlık: Enerji ve Tabii Kaynaklar Bakanlığını,
2. DSİ: Devlet Su İşleri Genel Müdürlüğünü,
3. EİE: Elektrik İşleri Etüt İdaresi Genel Müdürlüğünü,
4. EPDK: Enerji Piyasası Düzenleme Kurumunu,
5. TEFE: DİE tarafından yayımlanan Toptan Eşya Fiyat Endeksini,
6. Piyasa: Elektrik enerjisi piyasasını,
7. Lisans: Bir tüzel kişinin piyasada faaliyet gösterebilmesi için EPDK'dan almak zorunda olduğu yetki belgesini,
8. Ortak Tesis: Enerji üretimi yaninda sulama suyu, içme ve kullanma suyu temini ve taşkın koruma gibi birden fazla maksada hizmet eden tesisi,
9. Su Kullanım Hakkı Anlaşması: Hidroelektrik enerji üretim tesislerinin su kullanımına ilişkin işletme esaslarını ve DSİ'ye ödenecek bedellerin ödeme şeklini belirleyen yazılı hükümlere ve şartlara göre DSİ ile şirket arasında akdedilen anlaşma,
10. Şirket: Lisans almak üzere Su Kullanım Hakkı Anlaşması yapmak için müracaat eden anonim veya limited şirketi,

ifade eder.

Esaslar

Madde 3- Aşağıdaki maddelerde belirtilen hususlar, Adana İlinde elektrik enerjisi üretimi amacıyla şirket tarafından inşa edilecek 40,18 MWm / 36,16 MWe Kurulu Gücündeki Eğlence I hidroelektrik enerji üretim tesislerinin, lisansın geçerli olduğu süredeki su kullanımına ilişkin işletme esaslarını belirler.

Şirketin Yükümlülükleri

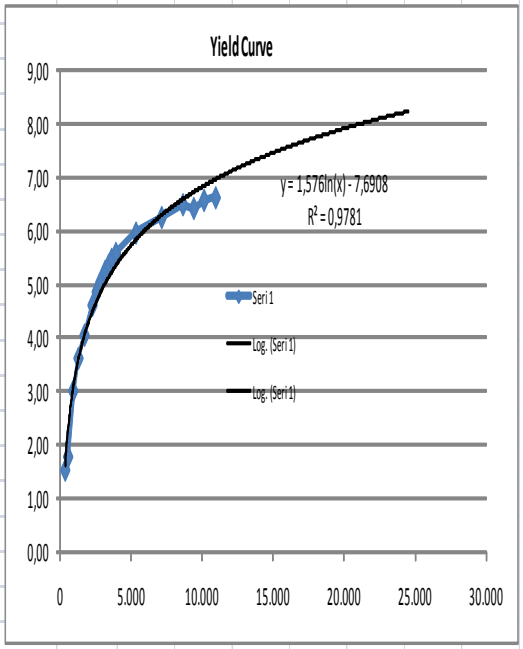
Madde 4- Hidroelektrik enerji üretim tesislerinin bulunduğu bölgenin havza gelişimine paralel olarak DSİ tarafından yürütülmekte olan çalışmalar çerçevesinde, havzadaki mevcut, inşa halinde ve mutasavver projeler (kesin proje, planlama, master plan, ön inceleme ve ilk etüt) kapsamında içme-kullanma, turizm ve endüstri suyu temini, sulama, taşkın koruma ve enerji maksatları ile bunların dışında olabilecek başka maksatlara yönelik olarak diğer kuruluşlara ve tüzel kişilere tahsis edilecek suların miktar ve zamanlamasını belirleyecek olan işletme planları DSİ tarafından yapılır ve şirkete bildirilir. Şirket bu planlara uymakla yükümlüdür.

Şirket, dere yatağının su alma yeri mansabında doğal hayatın idamesini sağlayacak ve bu kesimde su haklarını karşılayacak miktardaki suyu yatağa bırakacaktır. Doğal hayat için dere yatağına bırakılacak suyun miktar ve zamanlaması, kurulacak hidroelektrik enerji üretim tesisleri ile ilgili şirket tarafından hazırlanarak Çevre ve Orman Bakanlığı'ndan onay alınacak olan ÇED, ÇED Ön Araştırma Raporu'nda belirlenecektir.

ANNEX 4

The yield curve

As of	30.06.2010	Bond Name	Maturity	Days to Maturity	FX	Yield (Sell)	Yield (Buy)
		US900123AU49	30.06.2011	365	USD	3,85	1,54
		US900123AN06	23.01.2012	572	USD	3,54	1,79
		US900123AR10	14.01.2013	929	USD	4	3,02
		US900123AS92	15.01.2014	1295	USD	4,35	3,63
		US900123AV22	15.03.2015	1719	USD	4,68	4,06
		US900123AZ36	26.09.2016	2280	USD	5,11	4,62
		US900123BE97	14.07.2017	2571	USD	5,31	4,87
		US900123BA75	03.04.2018	2834	USD	5,47	5,05
		US900123BD15	11.03.2019	3176	USD	5,6	5,26
		US900123BF62	07.11.2019	3417	USD	5,69	5,37
		US900123AX87	05.06.2020	3628	USD	5,79	5,48
		US900123BH29	30.03.2021	3926	USD	5,91	5,59
		US900123AW05	05.02.2025	5334	USD	6,22	5,97
		US900123AL40	15.01.2030	7139	USD	6,42	6,26
		US900123AT75	14.02.2034	8630	USD	6,68	6,5
		US900123AY60	17.03.2036	9392	USD	6,73	6,43
		US900123BB58	05.03.2038	10110	USD	6,77	6,58
		US900123BG46	30.05.2040	10927	USD	6,82	6,63
		Theorethical Eurobond	30.06.2063	19358	USD		7,866



$$E(R_i) = R_f + \beta_i\left(E(R_m) - R_f\right)$$

Risk Free Rate (R_f)	7,87%	http://www.ziraat.com.tr/tr/bankamiz/faiz-ve-ucretler/aspx/eurobond.aspx
The Beta Coefficient (β_i)	0,939	Bloomberg (Please see "Beta" sheet)
Market risk premium ($E(R_m) - R_f$)	9.41%	http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem05.xls
Expected Market Return ($E(R_i)$)	16.71%	

ANNEX 5

Details of OM Calculation

CO2 Emissions		2007	2008	2009	2007	2008	2009
		GJ	GJ	GJ	CO_2 Emissions (t CO_2)		
EUAS							
	hard coal	25.393	23.086	22.828	2.356.465	2.142.382	2.118.454
	lignite	358.729	393.748	348.995	32.608.485	35.791.657	31.723.685
	fuel oil	28.860	39.666	15.019	2.178.901	2.994.764	1.133.925
	diesel oil	2.152	3.580	5.102	156.236	259.887	370.437
	natural gas	170.189	199.895	177.248	9.241.275	10.854.276	9.624.551
Autoproducers							
	hard coal	109.066	116.376	124.253	10.121.338	10.799.720	11.530.685
	imported coal				0	0	0
	lignite	61.291	59.377	59.852	5.571.312	5.397.387	5.440.556
	fuel oil	54.052	43.894	48.453	4.080.895	3.314.028	3.658.171
	diesel oil	13	1.980	2.560	912	143.774	185.881
	lpg	0	0	5	0	0	318
	naphta	494	473	353	34.237	32.786	24.430
	natural gas	579.872	591.649	602.610	31.487.039	32.126.555	32.721.721
Production companies							
	imported coal	0	0	0	0	0	0
	fuel oil	0	0	0	0	0	0
	diesel oil	0	0	0	0	0	0
	naphta	0	0	0	0	0	0
	natural gas	0	0	0	0	0	0
Mobile							
	fuel oil	6.829	2.717	0	515.565	205.151	0
	diesel oil	0	0	0	0	0	0
TOOR							
	lignite	0	0	0	0	0	0
	fuel oil	0	0	0	0	0	0
	diesel oil	0	0	0	0	0	0
		1.396.938	1.476.442	1.407.278	98.352.660	104.062.368	98.532.815

Turkey's Gros/Net Electricity Generation and Imports

Electricity generation (GWh)	2007	2008	2009
Gross Electricity Production	191.558,1	198.418,0	194.812,9
Net Electricity Production	183.339,7	189.761,9	186.619,3
Net/Gross	0,957	0,956	0,958
Net Electricity Production from Thermal Sources	148.333,3	156.768,3	150.323,4
Net Electricity Production incl. Mobile producers	148.333,3	156.768,3	150.323,4
Imports	864	789	812
Net Generated + Imports	149.197,6	157.557,7	151.135,4

Default IPCC Values

	kg CO_2/GJ			Default Carbon Oxidation Factor
	min	mid	max	
hard coal	92,8	96,1	100,0	1,0
lignite	90,9	101,0	115,0	1,0
fuel oil	75,5	77,4	78,8	1,0
diesel oil	72,6	74,1	74,8	1,0
natural gas	54,3	56,1	58,3	1,0
lpg	61,6	63,1	65,6	1,0
naphta	69,3	73,3	76,3	1,0

Fuel Consumptions

	Net Calorific Value (NCVi,y)		
	2007	2008	2009
hard coal	22,3	22,2	22,2
lignite	6,9	6,8	6,4
fuel oil	39,9	39,7	39,8
diesel oil	43,1	42,4	42,4
natural gas	36,7	36,6	37,2
lpg	0,0	0,0	0,0
naphtha	43,2	44,6	43,6

	2007	2008	2009
$EFgrid_{OMsimple,}$	0,663	0,664	0,655

EFGrid,OM,y (tCO2/MWh)	**0,6608**

ANNEX 6

Details of BM Calculation

Recently Commissioned Power Plants

			2009				
Company	Facility	Index	Installed Capacity (MW)	Commissioning Date	Energy Production (MWh)*	CO_2 EF (ton/TJ)	tCO_2
AK ENERJİ (AYYILDIZ RES)	WIND	AR	15	2009	51,0	-	
AK GIDA SAN. VE TİC. A.Ş. (Pamukova)	N.GAS	ANG	7,5	2009	61,0	54,3	0,
AKÇAY HES ELEKTRİK ÜR. (akçay hes)	HYDRO	AH	28,8	2009			
AKSA AKRİLİK KİMYA SAN. A.Ş. (YALOVA)	N.GAS	ANG	70	2009	539,0	54,3	0,
AKSA ENERJİ (Antalya) (İlave)	N.GAS	ANG	300	2009	2.310,0	54,3	0,
AKSA ENERJİ (Antalya) (İlave)	N.GAS	ANG	300	2009	2.310,0	54,3	0,
AKSA ENERJİ (Manisa) (İlave)	N.GAS	ANG	10,5	2009	83,1	54,3	0,
AKSA ENERJİ (Manisa) (İlave)	N.GAS	ANG	52,4	2009	414,9	54,3	0,
AKUA ENERJİ (Kayalık Reg. Ve HES)	HYDRO	AH	5,8	2009	39,0	-	
ALİZE ENERJİ (ÇAMSEKİ RES)	WIND	AR	20,8	2009			
ALİZE ENERJİ (KELTEPE RES)	WIND	AR	18,9	2009			
ALİZE ENERJİ (SARIKAYA RES) (Şarköy)	WIND	AR	28,8	2009			
ALKİM ALKALI KİMYA (Cihanbeyli/KONYA)	LIGNITE	AL	0,4	2009	3,0	90,9	0,
ANADOLU ELEKTRİK (ÇAKIRLAR HES)	HYDRO	AH	16,2	2009			
ANTALYA ENERJİ (İlave)	N.GAS	ANG	41,8	2009	302,1	54,3	0,
ARENKO ELEKTRİK ÜRETİM A:Ş. (Denizli)	N.GAS	ANG	12	2009	84,0	54,3	0,
AYEN ENERJİ A.Ş. AKBÜK RÜZGAR	WIND	AR	16,8	2009			
AYEN ENERJİ A.Ş. AKBÜK RÜZGAR İlave	WIND	AR	14,7	2009			
BAĞIŞLI REG. VE HES	HYDRO	AH	9,9	2009			

(CEYKAR ELEKT.)							
BAĞIŞLI REG. VE HES (CEYKAR ELEKT.) İlave	HYDRO	AH	19,7	2009			
BAKİ ELEKTRİK ŞAMLI RÜZGAR	WIND	AR	36	2009			
BAKİ ELEKTRİK ŞAMLI RÜZGAR	WIND	AR	33	2009			
BELEN ELEKTRİK BELEN RÜZGAR - HATAY	WIND	AR	15	2009			
BELEN ELEKTRİK BELEN RÜZGAR - HATAY	WIND	AR	15	2009			
BEREKET ENERJİ (KOYULHİSAR HES)	HYDRO	AH	42	2009	329,0	-	
BEYOBASI EN. ÜR. A.Ş. (SIRMA HES)	HYDRO	AH	5,9	2009	23,0	-	
BİL ENERJİ (DG+M) (Balgat)	N.GAS	ANG	36,6	2009	229,0	54,3	0,
BORASCO ENERJİ (BANDIRMA RES)	WIND	AR	21	2009			
BORASCO ENERJİ (BANDIRMA RES)	WIND	AR	24	2009			
CAM İŞ ELEKTRİK (Mersin) (İlave)	N.GAS	ANG	126,1	2009	1.008,0	54,3	0,
CARGILL TARIM VE GIDA SAN. TİC. A.Ş.	BIOGAS	AR	0,1	2009	0,7	-	
CİNDERE HES (Denizli)	HYDRO	AH	19,1	2009	58,0	-	
ÇELİKLER TAAH. İNŞ. (RİXOX GRAND)				2009			
DALSAN ALÇI SAN. VE TİC. A.Ş.	N.GAS	ANG	1,2	2009	9,0	54,3	0,
DATÇA RES (Datça)	WIND	AR	0,8	2009			
DATÇA RES (Datça)	WIND	AR	8,9	2009			
DATÇA RES (Datça) (İlave)	WIND	AR	11,8	2009			
DEĞİRMENÜSTÜ EN. (KAHRAMANMARAŞ)	HYDRO	AH	12,9	2009	35,4	-	
DELTA ENERJİ ÜRETİM VE TİC. A.Ş.	N.GAS	ANG	47	2009	365,8	54,3	0,
DELTA ENERJİ ÜRETİM VE TİC. A.Ş. (İlave)	N.GAS	ANG	13	2009	101,2	54,3	0,
DENİZLİ ELEKTRİK (EGE I HES)	HYDRO	AH	0,9	2009	4,0	-	
DESA ENERJİ ELEKTRİK ÜRETİM A.Ş.	N.GAS	ANG	9,8	2009	70,0	54,3	0,
E.ŞEHİR END. ENERJİ (DG+M) (Eskişehir-2)	N.GAS	ANG	59	2009	452,0	54,3	0,
EGE BİRLEŞİK ENERJİ (LPG+DG+M) (Aliağa)	N.GAS	ANG	12,8	2009	107,0	54,3	0,
ELESTAŞ ELEKTRİK (YAYLABEY HES)	HYDRO	AH	5,1	2009	20,0	-	
ELESTAŞ ELEKTRİK	HYDRO	AH	1,1	2009	6,0	-	

(YAZI HES)							
ENTEK KÖSEKÖY (İztek) (Düzeltme)	N.GAS	ANG	0,8	2009	6,4	54,3	0,
ENTEK KÖSEKÖY (İztek) (Düzeltme)	N.GAS	ANG	36,3	2009	288,9	54,3	0,
ERDEMİR (Ereğli-Zonguldak)	N.GAS	ANG	39,2	2009	236,7	54,3	0,
ERVA ENERJİ (KABACA REG. VE HES)	HYDRO	AH	4,2	2009	16,3	-	
ERVA ENERJİ (KABACA REG. VE HES)	HYDRO	AH	4,2	2009	16,3	-	
FALEZ ELEKTRİK ÜRETİMİ A.Ş.	N.GAS	ANG	11,7	2009	88,0	54,3	0,
FİLYOS ENERJİ (YALNIZCA REG. VE HES)	HYDRO	AH	14,4	2009			
GLOBAL ENERJİ (PELİTLİK)	N.GAS	ANG	8,6	2009	65,7	54,3	0,
GÜL ENERJİ ELKT. ÜRET. SN. VE TİC. A.Ş.	N.GAS	ANG	24,3	2009	170,0	54,3	0,
GÜRMAT ELEKT. (GÜRMAT JEOTERMAL)	GEOTHERMAL	AH	47,4	2009	313,0	-	
HABAŞ ALİAĞA	N.GAS	ANG	224,5	2009	1.796,0	54,3	0,
HABAŞ (BİLECİK) (Paşalar)	F.OIL	AF	18	2009	144,0	75,5	0,
HABAŞ (İZMİR) (Habaş)	F.OIL	AF	36	2009	288,0	75,5	0,
HAYAT KAĞIT	N.GAS	ANG	7,5	2009	56,0	54,3	0,
ITC-KA ENERJİ (SİNCAN)	RENEW.+WASTES	AR	2,8	2009			
ITC-KA ENERJİ MAMAK KATI ATIK TOP. MERK.	RENEW.+WASTES	AR	2,8	2009			
İÇDAŞ ÇELİK (İlave)	IMPORTED COAL	AHC	135	2009	961,7	92,8	0,
İÇDAŞ ÇELİK (İlave)	IMPORTED COAL	AHC	135	2009	961,7	92,8	0,
KALEN ENERJİ (KALEN I-II HES)	HYDRO	AH	15,7	2009			
KAREL ENERJİ (Pamukova)	HYDRO	AH	9,3	2009	55,0	-	
KASAR DUAL TEKSTİL SAN. A.Ş. (Çorlu)	N.GAS	ANG	5,7	2009	38,0	54,3	0,
KAYEN ALFA ENERJİ (KALETEPE HES)	HYDRO	AH	10,2	2009	37,0	-	
KEN KİPAŞ ELEKTRİK ÜRETİM (KAREN)	N.GAS	ANG	41,8	2009	180,0	54,3	0,
KEN KİPAŞ ELKT. ÜR. (KAREN) (K.MARAŞ)	N.GAS	ANG	17,5	2009	75,4	54,3	0,
KISIK	HYDRO	EH	9,6	2009	26,0	-	
KONYA ŞEKER SAN. VE TİC. A.Ş.				2009			
KORES KOCADAĞ RES (Urla/İZMİR)	WIND	AR	15	2009			
LAMAS III-IV HES (TGT	HYDRO	AH	35,7	2009			

ENERJİ ÜRETİM)							
MAKSİ ENERJİ ELEKTRİK ÜRETİM A.Ş.	N.GAS	ANG	7,7	2009	55,0	54,3	0,
MARMARA PAMUKLU MENS. SN. TİC. A.Ş.	N.GAS	ANG	34,9	2009	271,5	54,3	0,
MAURİ MAYA SAN. A.Ş.	N.GAS	ANG	0,3	2009	2,5	54,3	0,
MAURİ MAYA SAN. A.Ş.	N.GAS	ANG	2	2009	16,5	54,3	0,
MAZI-3 RES ELEKT. ÜR. A.Ş. (MAZI-3 RES)	WIND	AR	10	2009			
MAZI-3 RES ELEKT. ÜR. A.Ş. (MAZI-3 RES)	WIND	AR	12,5	2009			
MODERN ENERJİ (B.Karıştıran)	N.GAS	ANG	96,8	2009	680,0	54,3	0,
MOSB Enerji Elektrik Üretim Ltd. Şti.	N.GAS	ANG	84,8	2009	434,0	54,3	0,
NUH ÇİMENTO SAN. TİC A.Ş. (Nuh Çim.) (İlave)	N.GAS	ANG	47	2009	329,0	54,3	0,
OBRUK HES	HYDRO	EH	212,4	2009	473,0	-	
ORTADOĞU ENERJİ (KÖMÜRCÜODA)	RENEW.+WASTES	AR	5,8	2009			
ORTADOĞU ENERJİ (ODAYERİ) İlave	RENEW.+WASTES	AR	4,2	2009			
ORTADOĞU ENERJİ (ODAYERİ) İlave	RENEW.+WASTES	AR	5,7	2009			
ÖZGÜR ELEKTRİK /AZMAK II REG. VE HES)	HYDRO	AH	24,4	2009	91,0	-	
ÖZTAY ENERJİ (GÜNAYSE REG. VE HES)	HYDRO	AH	8,3	2009			
ÖZYAKUT ELKT. ÜR. A.Ş. (GÜNEŞLİ HES)	HYDRO	AH	0,6	2009	2,7	-	
ÖZYAKUT ELKT. ÜR. A.Ş. (GÜNEŞLİ HES)	HYDRO	AH	1,2	2009	5,3	-	
PETKİM ALİAĞA (Aliağa)	F.OIL	AF	222	2009	1.554,0	75,5	0,
PETKİM ALİAĞA (Aliağa) (Düzeltme) (ilave)	F.OIL	AF	52	2009	364,0	75,5	0,
RASA ENERJİ VAN	N.GAS	ANG	78,6	2009	500,0	54,3	0,
REŞADİYE 3 HES	HYDRO	AH	22,3	2009	175,0	-	
ROTOR ELEKTRİK (OSMANİYE RES)	WIND	AR	17,5	2009			
ROTOR ELEKTRİK (OSMANİYE RES)	WIND	AR	17,5	2009			
ROTOR ELEKTRİK (OSMANİYE RES)	WIND	AR	22,5	2009			
SARITEPE HES	HYDRO	AH	2,5	2009	10,0	-	
SARITEPE HES	HYDRO	AH	2,5	2009	10,0	-	
SAYALAR RÜZGAR	WIND	AR	3,6	2009			
SELKASAN KAĞIT PAKETLEME MALZ. İM.	N.GAS	ANG	9,9	2009	73,0	54,3	0,
SİLOPİ ELEKTRİK	IMPORTED COAL	AHC	135	2009	945,0	92,8	0,

ÜRETİM A.Ş.							
SİLOPİ ELEKTRİK ÜRETİM A.Ş. (Esenboğa)	F.OIL	AF	44,8	2009	315,0	75,5	0,
SOMA ENERJİ ÜRETİM (SOMA RES)	WIND	AR	18	2009			
SOMA ENERJİ ÜRETİM (SOMA RES) (İlave)	WIND	AR	10,8	2009			
SOMA ENERJİ ÜRETİM (SOMA RES) (İlave)	WIND	AR	16,2	2009			
SÖNMEZ ELEKTRİK (UŞAK) (İlave)	N.GAS	ANG	8,7	2009	67,1	54,3	0,
SÜPER FİLM (G.Antep)	F.OIL	AF	25,3	2009	203,0	75,5	0,
ŞAHİNLER ENERJİ (Çorlu/TEKİRDAĞ)	N.GAS	ANG	26	2009	185,0	54,3	0,
ŞİRİKÇİOĞLU EL. (KOZAK BENDİ VE HES)	HYDRO	AH	4,4	2009	15,0	-	
TAŞOVA YENİDEREKÖY HES (HAMEKA A.Ş.)	HYDRO	AH	2	2009	10,0	-	
TAV İSTANBUL TERMİNAL İŞLETME A.Ş.	N.GAS	ANG	3,3	2009	27,6	54,3	0,
TAV İSTANBUL TERMİNAL İŞLETME A.Ş.	N.GAS	ANG	6,5	2009	54,4	54,3	0,
TEKTUĞ (Erkenek)	HYDRO	AH	6	2009	24,0	-	
TEKTUĞ (Erkenek) (İlave)	HYDRO	AH	6,5	2009	26,0	-	
TESCO KİPA KİTLE PAZ. TİC. VE GIDA A.Ş.	N.GAS	ANG	2,3	2009	18,0	54,3	0,
TİRE-KUTSAN (Tire)	F.OIL	AF	8	2009	37,0	75,5	0,
TOCAK I HES (YURT ENERJİ ÜRETİM SN.)	HYDRO	AH	4,8	2009	13,0	-	
TÜM ENERJİ (PINAR REG. VE HES)	HYDRO	AH	30,1	2009	138,0	-	
TÜPRAŞ RAFİNERİ (Aliağa/İZMİR)	N.GAS	ANG	24,7	2009	170,0	54,3	0,
TÜRRAŞ O.A.RAFİNERİ (Kırıkkale) (Düzeltme)	F.OIL	AF	10	2009	70,0	75,5	0,
UZUNÇAYIR HES (Tunceli)	HYDRO	AH	27,3	2009			
ÜTOPYA ELEKTRİK (DÜZOVA RES)	WIND	AR	15	2009			
YAPISAN (KARICA REG. VE DARICA I HES)	HYDRO	AH	48,5	2009	164,0	-	
YAPISAN (KARICA REG. VE DARICA I HES)	HYDRO	AH	48,5	2009	164,0	-	
YEŞİLBAŞ ENERJİ (YEŞİLBAŞ HES)	HYDRO	AH	14	2009	56,0	-	
YPM GÖLOVA HES	HYDRO	AH	1,1	2009	3,0	-	
YPM SEVİNDİK HES	HYDRO	AH	5,7	2009	36,0	-	
YURTBAY ELEKTRİK	N.GAS	ANG	6,9	2009	50,0	54,3	0,

ÜRETİM A.Ş.							
ZORLU ENERJİ (B.KARIŞTIRAN) (İlave)	N.GAS	ANG	49,5	2009	395,0	54,3	0,
				2008			
Company	**Facility**	**Index**	**Installed Capacity (MW)**	**Commissioning Date**	**Energy Production (MWh)***	**CO_2 EF** (ton/TJ)	**tCO_2**
MB Şeker Nişasta San. A.Ş. (Sultanhanı)	N.GAS	ANG	8,80	2008	60,0	54,3	0,
AKSA ENERJI (Antalya)	N.GAS	ANG	183,80	2008	1.290,0	54,3	0,
AKSA ENERJI (Manisa)	N.GAS	ANG	52,38	2008	370,0	54,3	0,
ANTALYA ENERJİ (ilave)	N.GAS	ANG	17,46	2008	122,3	54,3	0,
ATAÇ İNŞAAT SAN. A.S.B. (ANTALYTA)	N.GAS	ANG	5,40	2008	37,0	54,3	0,
BAHÇIVAN GIDA (LÜLEBURGAZ)	N.GAS	ANG	1,17	2008	8,0	54,3	0,
CAN ENERJİ (Çorlu - Tekirdağ) (İlave)	N.GAS	ANG	52,38	2008	304,2	54,3	0,
FOUR SEASONS OTEL (ATİK PASHA TUR A.Ş.)	N.GAS	ANG	1,17	2008	7,0	54,3	0,
FRITOLAY GIDA San. Ve TİC. A.Ş. (İlave)	N.GAS	ANG	0,60	2008	4,0	54,3	0,
ITC-KA Enerji Üretim A.Ş. (Mamak(İlave)	RENEW.+WASTES	AR	14,13	2008			
KARKEY (SİLOPİ-5) (154kV) (İlave)	F.OIL	AF	14,78	2008	103,2	75,5	0,
MELİKE TEKSTİL (GAZİANTEP)	N.GAS	ANG	1,58	2008	11,0	54,3	0,
MİSİS APRE TEKSTİL BOYA EN. SAN.	N.GAS	ANG	2,00	2008	14,0	54,3	0,
MODERN ENERJİ (LİLEBURGAZ)	N.GAS	ANG	13,40	2008	94,1	54,3	0,
ORTADOĞU ENERJİ (ODA YERİ) (Eyip/İST.)	RENEW.+WASTES	AR	2,83	2008			
POLAT TURZ. (POLAT RENAISSANCE İST.OT.)	N.GAS	ANG	1,60	2008	11,0	54,3	0,
SARAYKÖY JEOTERMAL (Denizli)	GEOTHERMAL	AH	6,85	2008	50,0	-	
YILDIZ SUNTA (Uzunçiftlik-Köseköy)(Düzelt)	N.GAS	ANG	22,63	2008	146,5	54,3	0,
SÖNMEZ Elektrik (İlave)	N.GAS	ANG	8,73	2008	67,3	54,3	0,
ALP ELEKTRİK TINAZTEPE / ANTALYA	HYDRO	AH	7,69	2008	29,0	-	
CANSU ELEKTRİK (Murgul/Artvin)	HYDRO	AH	9,18	2008	47,0	-	
ÇELDERE ELK. (ÇALDERE HES)	HYDRO	AH	8,74	2008	35,0	-	
DAREN HES ELEKTRİK	HYDRO	AH	49,70	2008	182,0	-	
DEĞİRMENÜSTÜ EN.	HYDRO	AH	25,70	2008	69,0	-	

(Kahramanmaraş)							
GÖZEDE HES (TEMSA ELEKTRİK) Bursa	HYDRO	AH	2,40	2008	10,0	-	
H.G.M. Enerji (KEKLİCEK HES)	HYDRO	AH	8,67	2008	18,0	-	
HAMZALI HES (TURKON MNG ELEKTRİK)	HYDRO	AH	16,70	2008			
HİDRO KNT. (YUKARI MANAHOZ Reg. Ve Hes)	HYDRO	AH	22,40	2008	79,0	-	
İÇ-EN ELK. (ÇALKIŞLA REG. Ve HES)	HYDRO	AH	7,66	2008	18,0	-	
KALEN ENERJİ (KALEN II Reg. Ve Hes)	HYDRO	AH	15,65	2008			
MARAŞ ENERJİ (FIRNIS Reg. Ve HES)	HYDRO	AH	7,22	2008	36,0	-	
SARMAŞIK I HES (FETAŞ FETHİYE ENERJİ)	HYDRO	AH	21,04	2008	96,0	-	
SARMAŞIK II HES (FETAŞ FETHİYE ENERJİ)	HYDRO	AH	21,58	2008	108,0	-	
TORUL	HYDRO	EH	105,60	2008	322,0	-	
YEŞİL ENERJİ ELEKTRİK (TAYFUN HES)	HYDRO	AH	0,82	2008	5,0	-	
ZORLU ENERJİ (MERCAN)	HYDRO	AH	1,28	2008	4,9	-	
BAKİ ELEKTRİK ŞAMLI RÜZGAR	WIND	AR	21,00	2008			
DATÇA RES	WIND	AR	8,10	2008			
ERTÜRK ELEKTRİK Çatalca RES	WIND	AR	60,00	2008			
INNORES ELEKTRİK Yuntdağ RÜZG. (Aliağa)	WIND	AR	42,50	2008			
LODOS RES (Taşoluk)	WIND	AR	24,00	2008	85,0	-	
SAYALAR RÜZGAR	WIND	AR	30,60	2008			
SEBENOBA (Deniz Elk.)	WIND	AR	31,20	2008	100,0	-	
				2007			
Company	**Facility**	**Index**	**Installed Capacity (MW)**	**Commissioning Date**	**Energy Production (MWh)***	**CO_2 EF** (ton/TJ)	**tCO_2**
HABAŞ (Aliağa - İlave)	N.GAS	ANG	9,10	2007	72,8	54,3	0,
MODERN ENERJI	N.GAS	ANG	5,20	2007	38,7	54,3	0,
ARENKO	N.GAS	ANG	0,10	2007	0,8	54,3	0,
ALTINMARKA GIDA	N.GAS	ANG	0,10	2007	0,8	54,3	0,
TEKBOY ENERJI	N.GAS	ANG	0,10	2007	0,7	54,3	0,
VELSAN AKRILIK	N.GAS	ANG	0,10	2007	0,6	54,3	0,
Acıbaden Sağlık Hiz. Ve Tic. A.Ş. / Kadıköy	N.GAS	ANG	0,50	2007	4,0	54,3	0,
Acıbaden Sağlık Hiz. Ve Tic. A.Ş. / Kozyatağı	N.GAS	ANG	0,60	2007	5,0	54,3	0,
Acıbaden Sağlık Hiz. Ve	N.GAS	ANG	1,30	2007	11,0	54,3	0,

Tic. A.Ş. / Bursa							
AKATEKS	N.GAS	ANG	1,80	2007	14,0	54,3	0,
FLOKSER TEKSTIL / Poliser Tesisi	N.GAS	ANG	2,10	2007	17,0	54,3	0,
FLOKSER TEKSTIL / Süetser Tesisi	N.GAS	ANG	2,10	2007	17,0	54,3	0,
FRITOLAY GIDA	N.GAS	ANG	0,50	2007	4,0	54,3	0,
KIVANÇ TEKSTİL	N.GAS	ANG	3,90	2007	33,0	54,3	0,
KİL-KAN Kil San. Ve Tic	N.GAS	ANG	3,20	2007	25,0	54,3	0,
SÜPERBOY BOYA SAN.	N.GAS	ANG	1,00	2007	8,0	54,3	0,
SWISS OTEL	N.GAS	ANG	1,60	2007	11,0	54,3	0,
TAV Esenboğa	N.GAS	ANG	3,90	2007	33,0	54,3	0,
NUH ENERJİ-2	N.GAS	ANG	73,00	2007	514,0	54,3	0,
AKTEKS	F.OIL	AF	0,80	2007	5,4	75,5	0,
UŞAK ŞEKER	LIGNITE	AL	1,70	2007	10,3	90,9	0,
BOĞAZLIYAN ŞEKER	N.GAS+NAPHTHA	ANG	16,40	2007	102,6	54,3	0,
KARTONSAN	N.GAS+NAPHTHA	ANG	5,00	2007	40,0	54,3	0,
ESKİŞEHİR END. ENERJİ	N.GAS+NAPHTHA	ANG	3,50	2007	26,8	54,3	0,
ESKİŞEHİR ŞEKER	N.GAS+NAPHTHA	ANG	2,90	2007	18,1	54,3	0,
İGSAŞ	N.GAS+NAPHTHA	ANG	2,20	2007	15,2	54,3	0,
DESA	N.GAS+NAPHTHA	ANG	0,70	2007	5,6	54,3	0,
DENTAŞ	N.GAS+NAPHTHA	ANG	0,30	2007	2,3	54,3	0,
SÜPER FİLMCİLİK	N.GAS+NAPHTHA	ANG	0,10	2007	0,8	54,3	0,
ATAER ENERJİ	N.GAS+NAPHTHA	ANG	0,10	2007	0,6	54,3	0,
BİL ENERJİ	N.GAS+NAPHTHA	ANG	0,10	2007	0,7	54,3	0,
ITC-KA	RENEW.+WASTES	AR	1,40	2007			
BIS ENERJİ Bursa ilave	N.GAS	ANG	43,00	2007	354,8	54,3	0,
ALİAĞA ÇAKMAKTEPE	N.GAS	ANG	34,80	2007	278,0	54,3	0,
BİS ENERJİ Bursa DÜZELTİLME	N.GAS	ANG	28,30	2007	233,5	54,3	0,
BIS ENERJİ Bursa ilave	N.GAS	ANG	48,00	2007	396,1	54,3	0,
BOSEN ENERJİ	N.GAS	ANG	142,80	2007	1.071,0	54,3	0,
SAYENERJİ ELEKTRİK	N.GAS	ANG	5,90	2007	47,0	54,3	0,
T ENERJİ ÜRETİM A.Ş.	N.GAS	ANG	1,60	2007	13,0	54,3	0,
ZORLU ENERJİ Kayseri	N.GAS	ANG	7,20	2007	55,0	54,3	0,
SİİRT	F.OIL	AF	25,60	2007	190,0	75,5	0,
MARDİN KIZILTEPE	F.OIL	AF	34,10	2007	250,0	75,5	0,
KAREN	F.OIL	AF	24,30	2007	180,0	75,5	0,
İDİL 2 (PS3 A-2)	F.OIL	AF	24,40	2007	180,0	75,5	0,
BORÇKA HES	HYDRO	EH	300,60	2007	1.039,0	-	
TEKTUĞ (KEBAN DERESİ)	HYDRO	AH	5,00	2007	32,0	-	
YPM Ener. Yat. A.Ş. Altıntepe Hidro	HYDRO	AH	4,00	2007	18,0	-	
YPM Ener. Yat. A.Ş. Beypınar Hidro	HYDRO	AH	3,60	2007	18,0	-	
YPM Ener. Yat. A.Ş. Konak Hidro	HYDRO	AH	4,00	2007	19,0	-	
KURTEKS Tekstil (KARASU HES - Andırın)	HYDRO	AH	2,40	2007	19,0	-	
ISKUR TEKSTIL (SULEYMANLI HES)	HYDRO	AH	4,60	2007	18,0	-	

ÖZGÜR ELK. AŞ. (K.MARAŞ) (Tahta)	HYDRO	AH	6,30	2007	27,0	-	
ÖZGÜR ELK. AŞ. (K.MARAŞ) (Tahta) İlave	HYDRO	AH	6,30	2007	27,0	-	
ANEMON EN: ELEK. ÜRETİM A.Ş.	WIND	AR	8,00	2007			
ANEMON EN: ELEK. ÜRETİM A.Ş. İlave	WIND	AR	15,20	2007			
ANEMON EN: ELEK. ÜRETİM A.Ş. İlave	WIND	AR	7,20	2007			
BURGAZ RES (Doğal Enerji Üretim A.Ş.)	WIND	AR	4,00	2007			
BURGAZ RES (Doğal Enerji Üretim A.Ş.)	WIND	AR	10,90	2007			
DENİZ ELEK. ÜRETİM Ltd. Şti. (Karakurt)	WIND	AR	10,80	2007	28,0	-	
MARE MMANASTIR RÜZGAR ENERJİ	WIND	AR	11,2	2007			
MARE MMANASTIR RÜZGAR ENERJİ	WIND	AR	20,00	2007			
				2006			
Company	**Facility**	**Index**	**Installed Capacity (MW)**	**Commissioning Date**	**Energy Production (MWh)***	**CO_2 EF** (ton/TJ)	**tCO_2**
EKOTEN TEKSTİL GR-I	N.GAS	ANG	1,93	16.02.2006	14,0	54,3	0,
ERAK GİYİM GR-I	N.GAS	ANG	1,37	22.02.2006	10,0	54,3	0,
ALARKO ALTEK GR-III	N.GAS	ANG	21,89	23.02.2006	158,3	54,3	0,
AYDIN ÖRME GR-I	N.GAS	ANG	7,52	25.02.2006	60,0	54,3	0,
NUH ENERJİ-2 GR II	N.GAS	ANG	26,08	02.03.2006	180,1	54,3	0,
MARMARA ELEKTRİK (çorlu) GR-I	N.GAS	ANG	8,73	13.04.2006	63,0	54,3	0,
MARMARA PAMUK (Çorlu) GR-I	N.GAS	ANG	8,73	13.04.2006	63,0	54,3	0,
ENTEK (Köseköy) GR IV	N.GAS	ANG	47,62	14.04.2006	391,3	54,3	0,
ELSE TEKSTİL (Çorlu) GR I-II	N.GAS	ANG	3,16	15.04.2006	25,0	54,3	0,
BARES IX GRUP	WIND	AR	13,50	20.04.2006	47,3	-	
SÖNMEZ ELEKTRİK (Çorlu) GR I - II	N.GAS	ANG	17,46	03.05.2006	126,0	54,3	0,
DENİZLİ ÇİMENTO (DÜZELTME)	N.GAS	ANG	0,45	04.05.2006	3,2	54,3	0,
MENDERES ELEKTRİK GR I	GEOTHERMAL	AH	7,95	10.05.2006	56,0	-	
KASTAMONU ENTEGRE BALIKSİR GR-I	N.GAS	ANG	7,52	24.05.2006	54,0	54,3	0,
BARES X. VE XX. GRUPLAR	WIND	AR	16,50	26.05.2006	57,8	-	
BOZ ENERJİ GR-I	N.GAS	ANG	8,73	09.06.2006	70,0	54,3	0,
ADANA ATIK SU ARITMA TESİSİ	RENEW.+WASTES	AR	0,80	09.06.2006	6,0	-	

AMYLUM NİŞASTA (ADANA)	N.GAS	ANG	14,25	09.06.2006	34,0	54,3	0,
ŞIK MAKAS (Çorlu) GR-I	N.GAS	ANG	1,58	22.06.2006	13,0	54,3	0,
ELBİSTAN B GR-III	LIGNITE	EL	360,00	23.06.2006	2.340,0	90,9	0,
ANTALYA ENERJİ GR I - II - III - IV	N.GAS	ANG	34,92	29.06.2006	245,0	54,3	0,
HAYAT TEM. VE SAĞLIK GR I - II	N.GAS	ANG	15,04	30.06.2006	108,0	54,3	0,
EKOLOJİK EN. (Kemerburgaz) GR I	RENEW.+WASTES	AR	0,98	31.07.2006	6,0	-	
EROĞLU GİYİM (Çorlu) GR-I	N.GAS	ANG	1,17	01.08.2006	9,0	54,3	0,
CAM İŞ ELEKTRİK (Mersin) GR I	N.GAS	ANG	126,10	13.09.2006	1.008,0	54,3	0,
ELBİSTAN B GR II	LIGNITE	EL	360,00	17.09.2006	2.340,0	90,9	0,

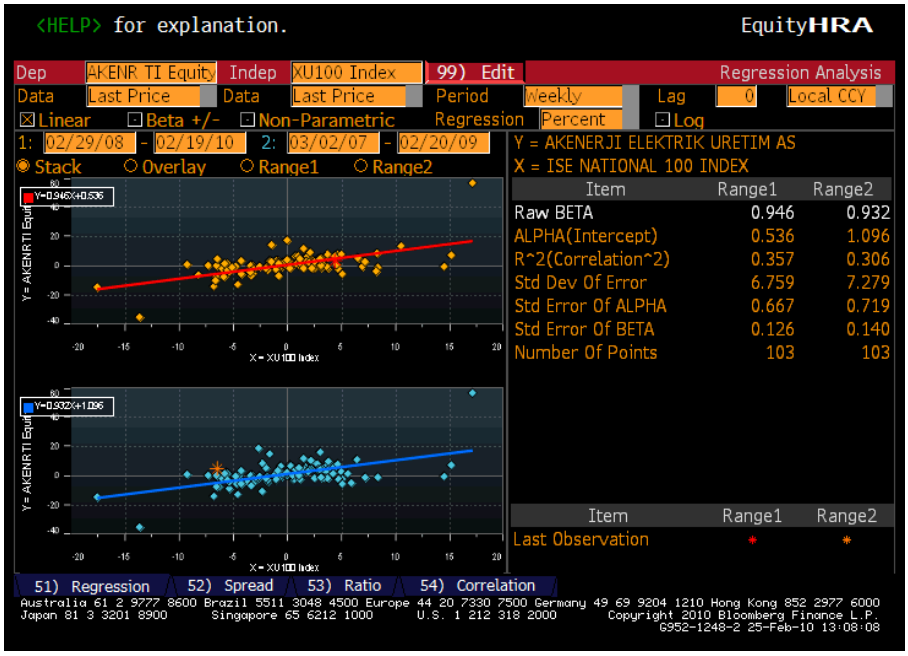
NOTE 1: The projects in the table above which are coloured in green are excluded from the Built Margin emission Factor Calculations, since these projects are developed as VER projects.

NOTE 2: The projects in the table above which are coloured in red are also excluded from the calculations, since the electricity productions figures for these power plants are not available.

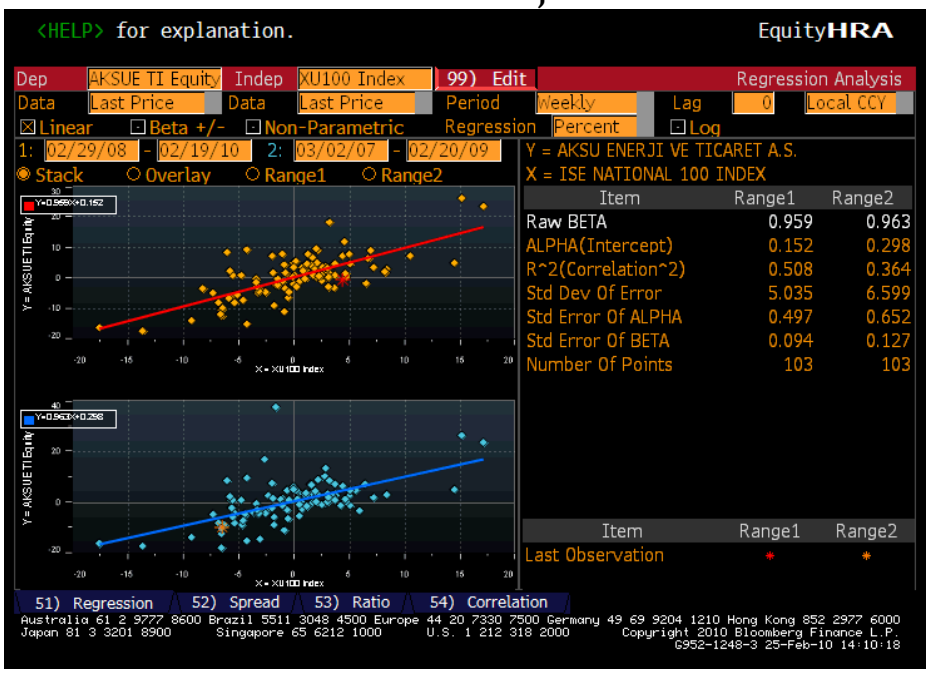
ANNEX 7

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

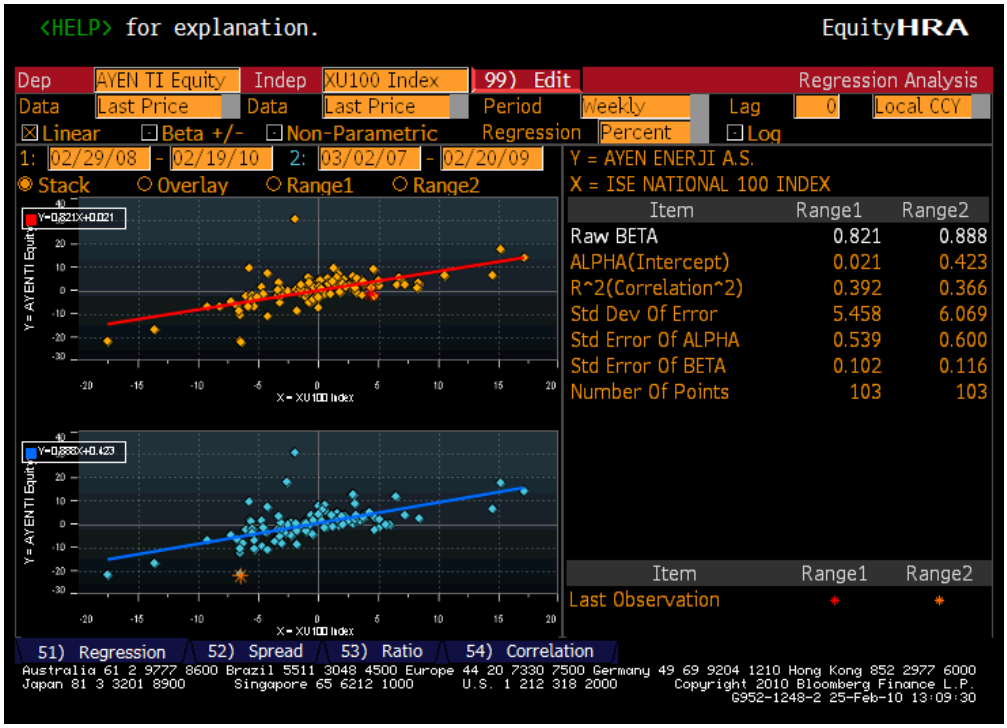
AK ENERJI



Aksu Enerji



Ayen Enerji



Zorlu Enerji