CDM – Executive Board

CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

ÇAY Hydroelectric Power Plant of 10.93 MWe installed power – Turkey
Version number of document: 01
Date: 30/04/2012

A.2. Description of the small-scale project activity:

Çay Hydroelectric Power Plant project (called "the Project" hereinafter) will be developed by Martı Enerji Üretim A.Ş (Martı Energy Production INC.) at Giresun Province, in the boundaries of Espiye, Tirebolu and Güce Districts in the Blacksea Region. Within the scope of the project, Çay Weir will be constructed on Özlüce (Gelevera) Creek and linked to Çay power house with an installed capacity of 10.93 MWe.

Based on annual total electricity generation amount, 35061 MWh, Çay Weir and HEPP project will result in a CO_2 reduction of 19515 tons annually due to use of renewable resources. The construction of the project is expected to start on March 2012 and the plant is expected to start the operation on September 2014.

The only purpose of the proposed project is to produce energy. The project designed as a hydroelectric power plant which does not consume water while operating. Water that will be diverted to the transmission tunnel and then given back to the creek with the same quantity and quality. To this respect, no water will be consumed. The generated electricity will be connected to national interconnected system for public welfare.

A weir (auxiliary units: water intake structure, scouring sluice, sedimentation basin, fish passage), transmission tunnel, surge tank, penstock and a power house are the units of the proposed project.

The ecological flow amount and water rights of downstream users are the key concerns, releasing of them after weir structure preserve the ecological life/habitat and provide concord with downstream users and stakeholders. The specified amount of flow will be released for sustainability. The released water to creek is continuously measured by an flow meter which is positioned by the 22nd Regional Directorate of DSI[1] . The flow meter is connected to DSİ with an online system to be able monitor the released flow amount continuously.[2]

The scenario existing prior to the project activity is non-existence of any kind of power plant. There is no contribution to energy demand of turkey since no generation of electricity occurs. Prior to project activity, the energy is provided by the power plants existing all around the host country, Turkey, also known as applicable geographical area as per methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", version 04.0.0.

[1] The State Hydraulic Works
[2] Çay Weir and HEPP, Project Introductory File, page 16

The baseline scenario is the same as the scenario existing prior to the project activity.

Small HEPP projects are among the projects with minimal impact on environment and local people than large hydro projects.[3] Furthermore, no environmentally harmful emission is anticipated. After the conversion of potential energy of water to electrical energy the water flow will be maintained without any pollution or chemical/physical alteration. All regulations regarding the protection of air quality will be followed during the construction. Any solid and liquid wastes formed during the construction and operation of the plant will be collected and discharged in accordance with the Regulations 'Control of Solid Wastes' and 'Control of Water Pollution'.

The Martı Enerji Üretim A.Ş. was decided to register to the Gold Standard to go for the Carbon Credits by means of renewable energy project – Çay Weir and HEPP - implementation trading in the Voluntary Carbon Market.

Contribution to sustainable development

The renewable energy projects represent a clear contribution to the sustainable development since they substitute the consumption of fossil fuels by using the abundant natural resources of the region in an environmentally friendly way.

For the long-lasting of world resources and wellness of human being, a declaration was endorsed by 189 world leaders at the UN in September 2000, which is a commitment to work together to build a safer, more prosperous and equitable world. The Declaration was translated into a roadmap setting out eight time-bound and measurable goals to be reached by 2015, known as the Millennium Development Goals (MDGs).[4]

The Seventh MDG (Millennium Development Goals) proposed by UNDP is about ensuring environmental sustainability. In fact unlike the most of the other MDG targets, its goal is neither quantitative nor time-bounded. Since human well being is related to environmental factors, it is plain that the existence of human being is directly linked to environmental sustainability. As UNDP emphasize that "If forests are lost, soils degraded, fisheries depleted, waters polluted, or the air unbreathable, then achievements in poverty reduction may not be sustainable."[5] Hence, seeking power sources which has minimum adverse effect to environment, with the maximum generation capacity, especially by using renewable sources is crucial in the 21th century. Hydroelectric enterprises that are developed and operated in a manner that is economically viable, environmentally sensible and socially responsible represent the best concept of sustainable development.

In this chapter, the possible effects of Çay Weir and HEPP project will be assessed in the light of the knowledge bases of organization active in development such as UNDP etc.[6] as well as "Demonstration and assessment of additionality, version 06.0.0" EB 65.

[3] Frank Princiotta, Global Climate Change - The Technology Challenge, 2011, page 170
[4] Retrieved from http://content.undp.org/go/cms-service/download/asset?asset_id=2883030
[5] Chapter 6: Ensuring Environmental Sustainability at the National Level, Global Monitoring Report 2008, pg. 181
[6] GTZ, FAO, SNV, DFID, OXFAM, DANIDA, ODI.

The sustainable development matrix is defined within the conceptual and methodological framework of Tools. The scope of this matrix classified as three axes: (i) local/regional/global environment, (ii) social sustainability and development, (iii) economic and technological development.

As a matter of fact, these types of sustainable projects represent a strategic importance in the developing countries result in generating jobs, reducing resource (petroleum, coal and natural gas) imports, and it's well known that they can contribute to bring the welfare associated with the energy services to the remotes and poorest rural communities.[7] Sustainability considered in three headings as follows:

a) Socio-Economic Sustainability

- This kind of projects will increase local employment of skilled labor for the installation, operation and maintenance of equipment. The project promotes the sustainable economic development which complies with Long-Term Development Strategy of Turkey.[8]
- Improvement of vital conditions of the population, and poverty reduction by increasing the employment is achieved in between project continuation.
- This kind of projects increase the stability of Turkey's electricity generating capacity and installed capacity while substantially reducing the import rate of fossil fuel which is used in coal fired electricity generation.
- By means of using hydroelectric technology, Turkey will reduce its dependency on a dirty and non-renewable commodity such as diesel, coal and natural gas.

b) Environmental Sustainability

- Hydropower is a clean energy source that is emissions free, and there are no GHG emissions that are directly related to the use of hydropower for electricity production. Furthermore, most small scale hydro power projects do not require a large impoundment of water, which is a key reason why such projects are often referred to as environmentally-friendly, or "green power."[9] Hydroelectricity having zero emission of GHG, compared with power plants driven by gas, coal or oil, can help retard global warming. Although only 33% of the available hydroelectric potential has been developed, today hydroelectricity prevents the emission of GHG corresponding to the burning of 4,4 million barrels of petroleum per day worldwide.[10]

c) Technological Sustainability

- By the way of producing electricity and transferring to the national grid, the capacity of generating electricity capacity of Turkey is increased.
- This energy self sufficiency, will introduce a low carbon technology and reduce GHG produced by fossil fuels.
- Technology and know-how transfer are in progress during project installation and operation.

[7] Retrieved from http://www.sica.int/busqueda/Noticias.aspx?IDItem=55899&IDCat=3&IdEnt=117&Idm=2&IdmStyle=2
[8] T.R Prime Ministry State Planning Organization, 2001, www.dpt.gpv.tr
[9] Hydromax Energy Limited, http://www.hydromaxenergy.com/Green+Power/Green+Power.htm
[10] Retrieved from http://ga.water.usgs.gov/edu/hydroadvantages.html , December, 2010

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A.3. Project participants:

Name of Party involved (*) ((host) indicates a host party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (host country)	Martı Enerji Üretim A.Ş. (private company)	No

Martı Enerji Üretim A.Ş. is the owner of the generation license for the project activity.
Full contact information for the project participants is provided in Annex 1.

EN-ÇEV Enerji Çevre Yatırımları ve Danışmanlığı Haritacılık İmar İnşaat[11] Ltd. Şti. is the carbon consultant for this project.

Turkey, the host country, passed legislation in Parliament on February 5th 2009 to ratify the Kyoto Protocol - Turkey does not yet have a quantitative emission reduction limit and it is likely that it will not until post 2012 and therefore continues to be eligible for voluntary emission reduction projects in the interim period.

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

Turkey

A.4.1.2. Region/State/Province etc.:

Black Sea Region/ Province of Giresun / Espiye, Tirebolu and Güce Districts

A.4.1.3. City/Town/Community etc:

Project is located in the province of Giresun, Espiye, Tirebolu and Güce Districts.
The location of the project site is given below:

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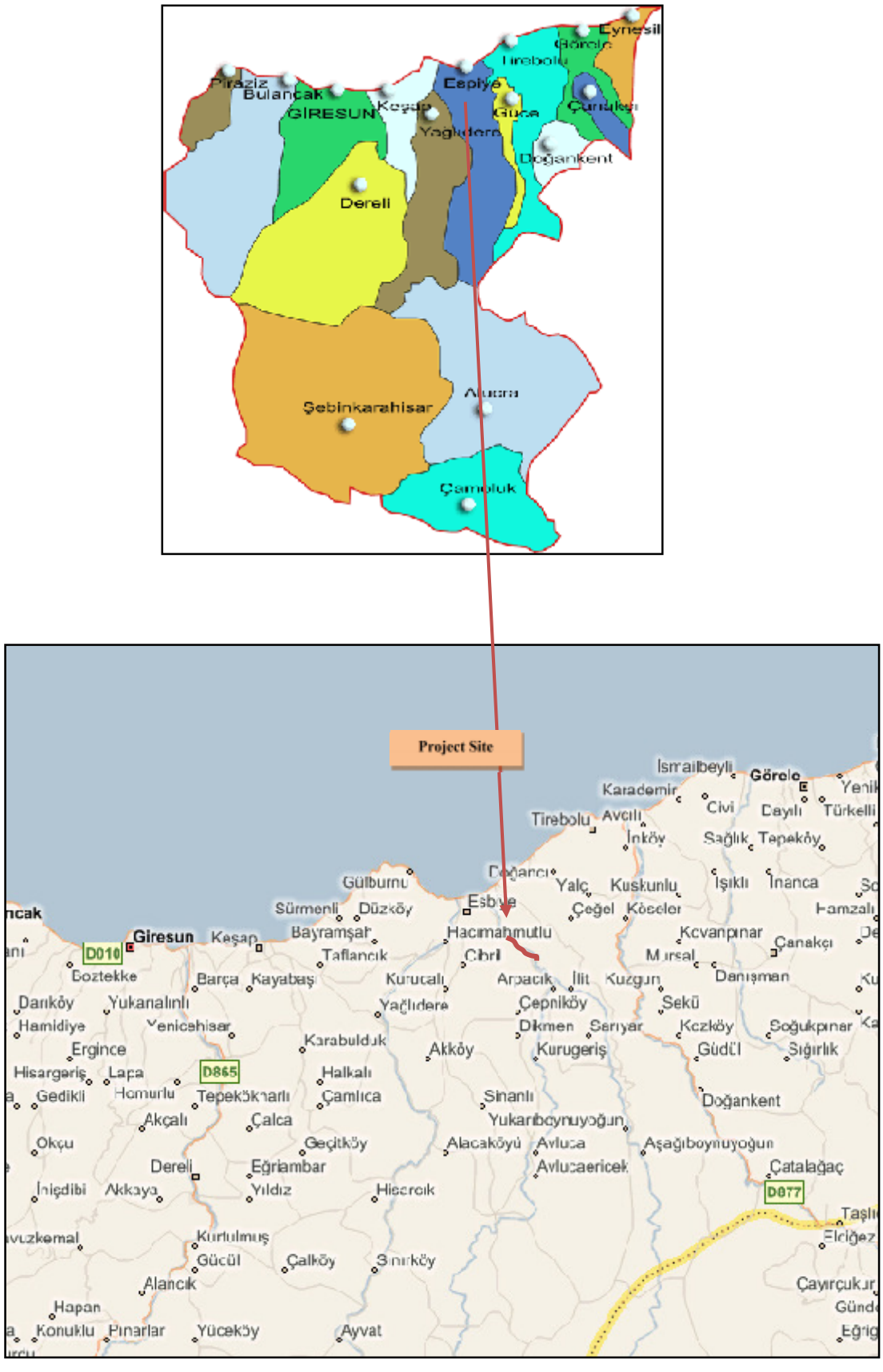

Figure 1: Identification of the Project area on Turkey map

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

The coordinates of Çay Weir is 40° 53' 32.88" N and 38° 47' 5.87" E. The coordinates of Çay power house is 40° 55' 33.98" N and 38° 44' 21.51" E. The closest settlement areas are tabulated below by the distance with respect to the structure within the scope of the proposed project.

The structure within the scope of the project	Neighbouring site	Distance (m)	Neighbouring site direction wrt the structure
Çay weir	Arpacik Village	500	South East
	Kemaliye Neighbouring	1000	North west
	Avlağıdere Neighbouring	800	South
Transmission tunnel	Kemaliye Neighbouring	800	West
	Tevekli Neighbouring	750	West
	Şirinköy	800	North west
Çay power house	Espiye Neighbouring	100	South
	Kale Neighbouring	800	South East

Source: Çay Weir and HEPP, Project Introductory File, page 13, Table 4and Annex 1, Topographical Map of Project

On 1/25000 scaled map, the Çay Weir lays on G41-b1 and Çay power house on G41-a2 numbered sheet.

Table 1: Coordinates of the Project Units

		Geographic - Decimal Degree	
Unit	**Point No**	Latitude	Longitude
Weir	1	40° 53' 32.88"	38° 47' 5.87"
Surge tank	1	40° 55' 32.15"	38° 44' 21.81"
Penstock	1	40° 55' 31.93"	38° 44' 28.18"
Power house	1	40° 55' 33.98"	38° 44' 21.51"

Source: Çay Weir and HEPP, Project Introductory File, page 56-57, Table 31

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

According to the latest Gold Standard VER Manual for Project Developers 15, the Project falls into the type A.1. - Renewable Energy. According to Appendix B of the UNFCC's published "Simplified Modalities and Procedures for Small-Scale Clean Development Mechanism Project Activities", category of this project activity is AMS-I.D: Grid Connected Renewable Electricity Generation.

The hydroelectric technology of proposed project uses the natural flow of water from a river to produce electricity. Within the scope of the proposed project Çay weir and power house will be established. The other units are water intake structure, sedimentation basin, transmission tunnel, surge tank, penstock and tail water channel. The proposed project was designed as; a portion of the river's flow is diverted to a powerhouse before the water is returned to its natural watercourse. The water reaches the powerhouse through a transmission channel and penstock, which drops from the intake structure. Once the water reaches the powerhouse, it has a high pressure and is directed into a turbine before it is fed back into the river. The power generated is connected to a local power grid through a high voltage transmission line. The environmental footprint of HEPPs without dams is typically considered lower-impact when compared to large scale hydroelectric facilities that have large water storage dams. There is no alteration of downstream flows, since all diverted water is returned to the stream below the powerhouse. Further, without a reservoir, the design attempts to mitigate the environmental concerns traditionally associated with commercial dam-based hydroelectric projects.

Technical Details

Table 2: The units of the Çay Weir and HEPP project and their characteristics[12]

Units	Characteristics
Weir	▪ crest elevation: 80 m ▪ thalweg elevation: 68 m ▪ height from thalweg: 12 m ▪ crest length : 60 m ▪ 2 gated scouring sluices (2mx2.5m) with 62.2 m basin elevation and 68 m top elevation ▪ Fish passage on weir structure
Water intake structure	▪ entrance elevation: 74 m ▪ entrance basin elevation: 72 m ▪ 3 gate with 3m x 4.5 m
Sedimentation basin	▪ width: 12 m ▪ length: 40 m ▪ slope of basin: 0,01
Transmission tunnel	▪ right side of Özlüce (Gelevera) Creek ▪ conduit length: 120 m ▪ channel length: 5742 m ▪ diameter: 3.2 m ▪ slope: 0,0045
Surge tank	▪ maximum water depth: 93.60 m ▪ minimum water depth: 53.95 m ▪ top elevation: 95 m ▪ basin elevation 49.45 m
Penstock	▪ diameter: 3 m ▪ length: 64.5 m ▪ pipe wall thickness: 10.33 mm
Power house	▪ right side of Özlüce (Gelevera) Creek ▪ project flow: 27.5 m^3/s ▪ tail water elevation: 20 m ▪ gross head: 60 m ▪ net head: 45.37 m

[12] Çay Weir and HEPP, Project Introductory File, page 4-8

	▪ 2 x horizontal axes Francis turbines ▪ Installed capacity: 11.38 MWm / 10.93 MWe ▪ firm energy : 3042 MWh/year ▪ secondary energy: 32019 MWh/year ▪ total energy: 35061 MWh/year
Energy Transmission Line	▪ 2 x 477 MCC ▪ 34.5 kV ▪ length: 3.5 km

The noise level will be increased based on the working of heavy vehicles during construction. A study related to noise level was performed in the Project Introductory File. [13]
Furthermore, the vibration impact due to blasting which will be performed during transmission tunnel construction was examined in the Project Introductory File.[14] The neighbourhood sites to the Project area are not affected from the noise level of machines during construction of Project units owing to the distance between areas as per the results of the study of noise level in the conducted Project Introductory File. It is stated that, the neighbouring areas are not expected to be affected negatively owning to the distance as well.[15]

The excavated material will not be stored at the project site after the completion of the construction. The temporary excavation storage sites will be specified by the permission of the State hydraulic Works. The sliding of excavation to the river bed is precisely forbidden as per regulations. Furthermore, the vegetated soil will be used for landscape reclamation and the excavated material will be used for the land filling purposed, road building and backfilling material. The residual excavation if any will be disposed to solid waste site as per regulations.[16]

All regulations relevant to noise pollution and excavation will comply with precisely.

The completion time of the project -total construction time- will be nearly 2.5 years and the economic life of the project, after the construction completed, is expected as 49 years.

The generated electricity will be connected to national interconnected system by energy transmission lines.

The minimum flow is the ecological water demand of water source of the project. Some amount of water shall be released to creek after weir structure to sustain the ecology in the river basin and stimulate the natural flow regime. With respect to the regulation on “Procedures and Principles on signing Water Right Agreement to engage in the Electricity Production Market” published in the official gazette no: 25150, date: 26/6/2003; amendment official gazette no: 27323, date: 18/08/2009, the minimum flow (ecological flow) should be at least 10% of annual average flow rate of Creek.

[13] Çay Weir and HEPP, Project Introductory File, page 33-38
[14] Çay Weir and HEPP, Project Introductory File, page 39-42
[15] Çay Weir and HEPP, Project Introductory File, page 53-54
[16] Çay Weir and HEPP, Project Introductory File, page 104-105

Table 3: The amount of minimum (ecological) flow released after weir structure during wet and dry seasons[17]

Months	Wet season: *April, May*	Dry Season: *other months*
Minimum (ecological) flow	1.5 m^3/s	4 m^3/s

Besides, in case of a reduction of water flow below the amount of minimum flow due to seasonal conditions, electricity generation is not allowed.

Çay Weir and HEPP project was designed without a reservoir structure.

Hence, during the operation phase, there will not be a change in the quality of water and any kind of microclimatic changes.

The vegetation will be disrupted because of the construction of units. The vegetation at the area is distributed broadly in Turkey. Hence, the disruption can be accepted as tolerable. The appropriate reclamation and landscaping activities with the topography and vegetal cover of the project area will be performed right after the finalization of construction activities.[18] The mitigation measures will be performed to provide the least disturbance of the vegetation, floral and faunal species and environment.[19]

An endemic species were not determined based on the on-site surveys and studies during the preparation of Project Introductory File.[20]

In order to stimulate the natural flow regime and sustain the fish living, fish passages under the weir structure will be constructed. Besides, fish migration is provided by fish passage which is designed properly to provide the transition of fishes.

The preference of using the labour force from the vicinity may be helpful to procure acceptance of proposed project and human and institutional capacity, social-economical sustainability will be favoured.

The proposed project contributes to reduction of emissions owing to electricity generation activities as a small hydro project. Based on annual total electricity generation amount, 35061 MWh, Çay Weir and HEPP project will result in a CO_2 reduction of 19515 tons annually.

[17] The Official Letter of Ministry of Environment and Forestry, General Directorate of Nature Conservation and National Parks
[18] Çay Weir and HEPP, Project Introductory File, page 109
[19] Çay Weir and HEPP, Project Introductory File, page 109
[20] Çay Weir and HEPP, Project Introductory File, page 92-95

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Table 4: Estimated amount of overall emission reductions by years

Year	Annual estimation of emission reductions in tonnes of tCO2-eq
September-December 2014 (for 4 months)	**6 505**
2015	**19 515**
2016	**19 515**
2017	**19 515**
2018	**19 515**
2019	**19 515**
2020	**19 515**
January-August 2021 (for 8 months)	**13 013**
Total number of crediting years	**7**
Total emission reductions (tonnes of CO2-eq)	136 605
Annual average over the crediting period of estimated reductions (tonnes of CO2-eq)	19 515

A.4.4. Public funding of the small-scale project activity:

The project does not obtain public funding. Please see Annex 2 for relevant document. The investment cost of the project is 47,462,893.24 USD [21]. The Project will be financed partly by the Private investing company's own equity and the rest is planned to be realised by bank loan.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

As highlighted in Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, a proposed small-scale project activity shall be deemed to be a de bundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

There are no projects in the scope of subjects above. In this respects, the proposed project, Çay Weir and HEPP project is not a bundling component of any other project.

[21] Çay Weir and HEPP, Feasibility Study Report, page 8-18, Table 8.3

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

Applied approved baseline and monitoring methodology:

- AMS-I.D "Approved Small Scale Methodology for Grid Connected Renewable Electricity Generation, version 17" EB 61

Used tools:

- "Demonstration and assessment of additionality, version 06.0.0" EB 65.
- "Tool to calculate the emission factor for an electricity system, version 02.2.1" EB 63.
- "Combined tool to identify baseline scenario and demonstrate additionality version 04.0.", EB66

B.2 Justification of the choice of the project category:

Methodology AMS-I.D "Approved Small Scale Methodology for Grid Connected Renewable Electricity Generation, version 17" is applicable to the proposed project activity because it fulfils the required criteria:

- The project comprises renewable energy generation by means of hydro power.
- It is a grid-connected electricity generation project.
- The installed capacity of the proposed project activity is 10.93 MWe which is lower than 15 MW.

The project activity will not have a capacity extension at any year of the crediting period. Hence the project activity will remain under the limits of the small-scale project activity types with 10.93 MWe installed capacity. Further, the project activity results in a small ponding area up to the weir structure to regulate the coming flow. Hence, the condition "the project activity results in a new reservoir and the power density is greater than $4W/m^2$" is satisfied to apply the methodology AMS-I.D "Approved Small Scale Methodology for Grid Connected Renewable Electricity Generation, version 17''.

B.3. Description of the project boundary:

The physical, geographical site of the renewable generation source delineates the project boundary according to the methodology AMS-I.D "Approved Small Scale Methodology for Grid Connected Renewable Electricity Generation, version 17". The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to. The GHG gases and emission sources included in the project boundary and used in calculation of emission reduction by the project activity are given in table below:

Table 5: Emissions sources included in or excluded from the project boundary

Source		Gas	Included	Justification / Explanation
Baseline	Electricity generation by power plants in baseline	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source- excluded for simplification
		N_2O	No	Minor emission source- excluded for simplification
Project Activity	Emission from the reservoir of the proposed project	CO_2	No	Minor emission source- excluded for simplification
		CH_4	Yes	Main emission source
		N_2O	No	Minor emission source- excluded for simplification

The project boundary is limited by the National Electricity Grid of Turkey. The geographical and physical boundaries of the Turkish grid and location of the power plants are clear. Import data obtained from related the relevant government agencies (TEIAS- Türkiye Elektrik İdaresi A.Ş.) have been included in the calculations of the combined margin emissions.

B.4. Description of baseline and its development:

In respect of approved small scale methodology AMS-I.D "Grid Connected Renewable Electricity Generation, version 17", the baseline scenario is "*the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.*"

Since the proposed project activity is *"the installation of a new grid-connected renewable power plant/unit ", the baseline scenario is defined as the consolidation of electricity delivered to the grid by the project activity and electricity generated by the operation of grid-connected power plants in Turkey and electricity produced by the new generation sources as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system, ver. 02.2.1".*

Installed electricity generation capacity in Turkey has reached 49524.1 megawatts (MW) as of 2010. Fossil fuels account for 65.18 % of the total installed capacity and hydro, geothermal, and wind account for the remaining 34.82%.[22]

Table 6: Breakdown of installed capacity of Turkish grid, 2010[23]

Primary Energy Source	MW	% of installed capacity, 2010
Thermal	32278.5	65.18%
Hydro	15831.2	31.97%
Geothermal + Wind	1414.4	2.86%

[22] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m(13-21)/13.xls

[23] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m(13-21)/13.xls

TOTAL	**49524.1**	**100**

Based on the above can be concluded that hydro power constitutes the lower share of the total electricity generation capacity of Turkey.

Electricity demand of Turkey has been growing continuously since the last decade due to the rapid growth in economy. In 2010, the electricity demand was 210,434 GWh[24] which corresponds to an increase of 8.4% compared to the previous year. The increase or decrease rates for electricity are presented in Table 7 below.

Table 7: The energy demand and increase rates between years 2001-2010[25]

Year	Energy Demand (GWh)	% increase
2001	126871	-1.1
2002	132553	4.5
2003	141151	6.5
2004	150018	6.3
2005	160794	7.2
2006	174637	8.6
2007	190000	8.8
2008	198085	4.3
2009	194079	-2.0
2010	210434	8.4

Even if the energy demand has decreased from 2008 to 2009, it must be noted that it is because of the fact that a significant economic crisis has occurred in 2008 and the energy consumptions decreased accordingly. Nonetheless, the energy demand was again increased in the year 2010 in line with the consideration of the capacity projection of TEIAS[26] (Refer to Figure 2 of this report).

In recent years, an upward trend has taken place in the consumption of natural gas in Turkey for both domestic and industrial use. The numerical increase in natural gas power plants aims to meet the growing energy demands of industries. Therefore, the share of hydroelectric power has dropped while the share of thermal energy has increased in overall energy generation.[27] Nevertheless, the European Union places great emphasis on green power in energy policies (hydroelectric, wind, solar, and biomass energies).[28] Thus, it is important to harmonize the energy policy and relevant legislation in Turkey with European energy policy. Consequently, the weight of hydroelectric power in overall generation needs to be increased.

[24] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/23.xls
[25] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/23.xls
[26] Retrieved from http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf
[27] Retrieved from http://www.dsi.gov.tr/english/service/enerjie.htm
[28] Retrieved from http://www.thegreenpowergroup.org/policy.cfm?loc=eu

Turkey, who intends to sustain its development, has tent to manage its energy supply-demand balance by the way of developing and constructing high capacity coal and natural gas power plants. The large natural resource availability, especially the abundance of economically accessible lignite and the governmental agreements on purchasing natural gas and accordingly developing infrastructure works promote the development of thermal power plants. In the absence of the proposed project activity, the same amount of electricity is required to be supplied by either the current power plants or by increasing the number of thermal power plants thus increasing GHG emissions.

According to the methodology AMS-I.D "Approved Small Scale Methodology for Grid Connected Renewable Electricity Generation, version 17" the baseline is the kWh produced by the renewable generating unit multiplied by an emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y}$$

Where:

BE_y = Baseline Emissions in year y (tCO_2)
$EG_{BL,y}$ = Energy baseline in year y (kWh)
EF_{CO2} = CO_2 Emission Factor in year y (t CO_2e/kWh)

Emission factor can be calculated in a transparent and conservative manner as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system, version 02.2.1".

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

Additionality is defined in 3/CMP.1, Annex, paragraph 43 as follows:

A CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

In other words, additionality is the requirement that the greenhouse gas emissions after implementation of a CDM project activity are lower than those that would have occurred in the most plausible alternative scenario to the implementation of the CDM project activity.

In this section, the additionality of proposed project will be discussed based on "Demonstration and assessment of additionality, version 06.0.0" EB 65 by applying the *step 1* of "Combined tool to identify the baseline scenario and demonstrate additionality, version 04.0.0".

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations realistic and credible alternative baseline scenarios for power generation

Realistic and credible alternatives to the project activity that can be a part of the baseline scenario are defined through the following steps:

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

The alternative scenario may be the business-as-usual case (that is, the continuation of current emission levels in the absence of the CDM project activity), or it may be some other scenario which involves a gradual lowering of emissions intensity.
The alternatives to the proposed project activity are listed in the table below.

Table 8: Alternatives to the project activity

Alternative A	Proposed project developed without the VER revenues
Alternative B	Same amount of electricity produced by other facilities not under the control of project participant (No action from the investors)
Alternative C	Construction of a wind power plant with the same installed capacity or the same annual power output
Alternative D	Construction of a thermal power plant with the same installed capacity or the same annual power output.

Alternative A which is the implementation of the project without carbon revenue is not financially attractive as discussed in investment analysis section below. Alternative B is the baseline scenario and implementation of the proposed project as a VER activity would be additional to this scenario. Alternative B does not seem as a realistic option due to expected energy demand increase in Turkey. Energy demand of Turkey is expected to expand at an average of %6.3 - %7 until 2018[29] in addition; the Figure 2 below shows the energy demand projection (conservative scenario) between 2010 and 2019 prepared by TEİAS. Based on this fact, the electric generation in Turkey should be increased anyway in accordance with the expected energy demand. Therefore, no action alternative is not a plausible option and HEPPs should be constructed in order to generate clean energy where applicable. [30]

Another alternative is considering a wind farm to generate the same amount of electricity. The wind conditions at the vicinity of Ordu is not proper for establishment a wind farm, besides wind conditions did not examined and a micro siting study did not conducted by the investor firm. Moreover, the fluctuations of the efficiencies for wind farms will not result in a stable energy generation rate from the investor's point of view. Hence, the wind farm alternative is not preferred.

[29] E. Kavukçuoğlu, Türkiye Elektrik Enerjisi Piyasası 2010-2011, Deloitte Turkey
[30] Electrical Energy Production Planning Study on Turkey 2005-2010, TEİAŞ, www.teias.gov.tr

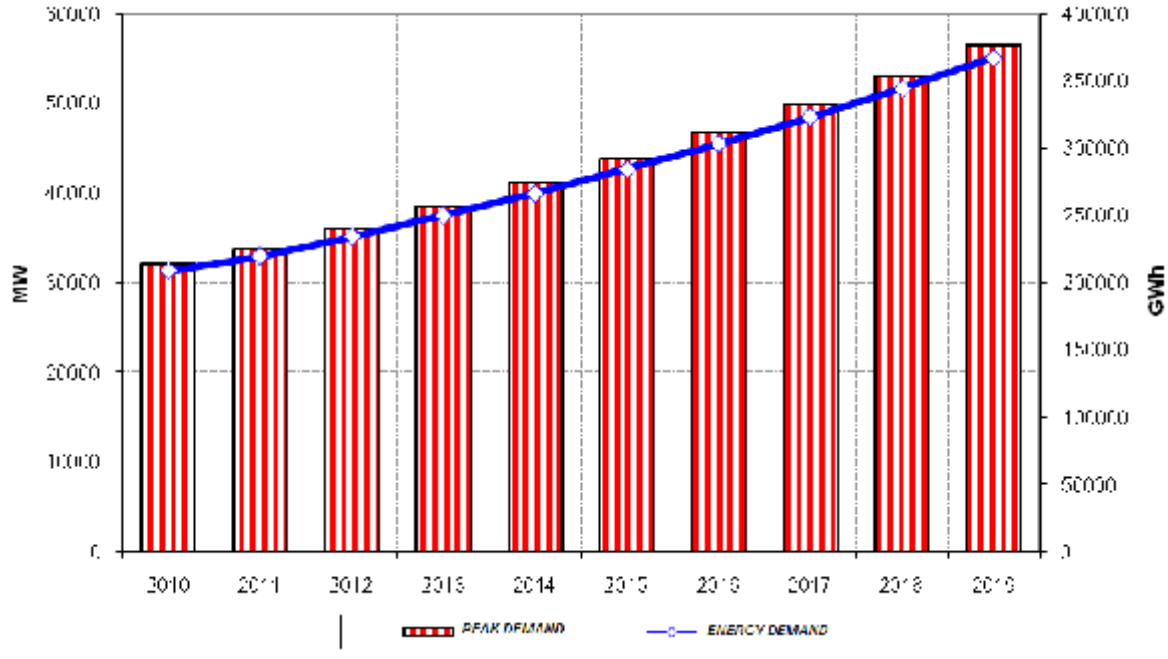

Figure 2: The energy demand projection between 2010 and 2019 (low demand)[31]

The last alternative, Alternative D, is considered as a significant alternative to the project activity. Since the share of thermal plants in the installed capacity of Turkey is considerably high which corresponds 65.18 %[32] of total installed capacity according to 2010 Turkish electrical statistics taken from TEIAS (Turkish Electricity Transmission Company).

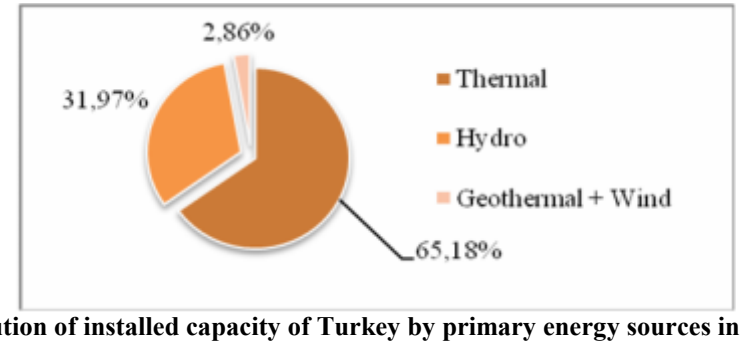

Figure 3: The distribution of installed capacity of Turkey by primary energy sources in 2010[33]

Outcome of Step 1a

Three realistic alternatives have been identified for the project scenario as defined above. In the absence of proposed VER activity, most likely scenarios will be;

- Supply of electricity by the grid which requires addition of new power plants or;
- Implementation of a thermal power plant to deliver electricity in order to meet the electricity demand.

[31] Retrieved from http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf, Page 13
[32] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m(13-21)/13.xls
[33] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m(13-21)/13.xls

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

The following applicable mandatory laws and regulations have been identified:

1. Electricity Market Law [Law Number: 4628 Ratification Date: 20.02.2001 Enactment Date: 03.03.2001][34]
2. Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy [Law Number: 5346 Ratification Date: 10.05.2005 Enactment Date: 18.05.2005][35]
3. Environment Law [Law Number: 2872 Ratification Date: 09.08.1983 Enactment Date: 11.08.1983][36]
4. Energy Efficiency Law [Law Number 5627, Enactment Date 02/05/2007] [37]
5. Forest Law [Law Number 6831, Enactment Date 31/08/1956][38]

All the alternatives to the project outlined in Step 1a above are in compliance with applicable laws and regulations.

Step 2: Investment analysis

The investment analysis for Çay Weir and HEPP Project in this Step 2 will be evaluated the following the four sub-steps: (i) Determine appropriate analysis method; (ii) Apply analysis method; (iii) Calculation and comparison of financial indicators; (iv) Sensitivity analysis.

Sub-step 2a: Determine appropriate analysis method

- The tool for "Demonstration and assessment of additionality, version 06.0.0" EB 65.

lists three possible analysis methods;

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

Since the financial and economic benefits generated by the proposed project activity by the way of 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 electricity production capacity. Between Option II and Option III, benchmark analysis method (Option III) is preferred as the investment analysis method for the proposed project.
Besides, the benchmark analysis (option III) as a suitable method for this Project type and decision making context will be used to analyze. Compared with other method (the simple cost analysis and investment comparison analysis) currently in use, the proposed method can be seen

[34] Retrieved from http://www.epdk.gov.tr/english/regulations/electricity.htm
[35] Retrieved from http://www.eie.gov.tr/duyurular/YEK/LawonRenewableEnergyReources.pdf
[36] Retrieved from http://rega.basbakanlik.gov.tr
[37] Retrieved from http://www.eie.gov.tr/english/announcements/EV_kanunu/EnVer_kanunu_tercume_revize2707.doc
[38] Retrieved from http://web.ogm.gov.tr/birimler/merkez/kadastro/Dokumanlar/KD1/Mevzuat/6831%20ORMAN%20KANUNU.pdf

the best option. Benchmark Analysis is provided with a realistic viewpoint relatively to give our in assessing project for economic viability and financial sustainability. There is no doubt that each method has its own advantages.

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

To select or calculate a benchmark with reliable and valid is very difficult in due to the market volatility (government bond rates etc.), its changes over time and project type has its own characteristics (supply, demand, price etc.).

Institutional capacity is necessary for these calculations. In this regard, the recognized and accepted widely the calculations (indicators) of international institutions (WB, IMF, UNCTAD, IFF etc.) can be used as benchmark.

- Equity IRR used by the World Bank (Sustainable Development Departments Turkey Country Unit) is 15% for small hydro.[39] We considered that this accepted benchmark IRR provides a more accurate and conservative view of the investment analysis effort. Eventually the applying benchmark will be 15% for comparison with the equity IRR in this investment analysis of the Çay Weir and HEPP Project.

- As is known, there are also benchmarks for other countries in the "Guidelines on the assessment of investment analysis, version 05", EB 62, and Annex 5. When it is seen, the highest benchmark is %18 and the lowest benchmark is %10.5 among the lots of countries. In this Tool, the benchmark IRR (The expected return on equity) is composed of four elements: (a) a risk free rate of return; (b) an equity risk premium; (c) a risk premium for the host country; and (d) an adjustment factor to reflect the risk of projects in different sectoral scopes. All values are expressed in real terms. Equity IRR used by the World Bank is parallel to the range of IRR in Tool.

Sub-step 2c: Calculation and comparison of financial indicators

The internal rate of return (IRR) calculation is a convenient technique for Çay Weir and HEPP Project in benchmark analysis. As it is known, IRR is a percentage figure that describes the yield or return of an investment over a multiyear period. For a given series of cash flows, the IRR is the discount rate that results in a net present value (NPV) of zero.

IRR can be calculated using directly the main parameters of project and other relevant financial items.

Table 9: Main parameters used for investments analysis

Parameters	Unit	Data Value
Installed Capacity	MWe	10.93
Electricity Generated	MWh	35061

[39] Retrieved from World bank-Project Appraisal Document on a IBRD Loan and a Proposed Loan from Clean Technology Fund to TKSB an TB with the Guarantee of Turkey (Report No: 46808-TR, dated May 1, 2009)

VAT amount	USD	6,760,573.96
Investment Cost (VAT included)	USD	54,223,467.20
Feed-in Tariff	€ Cents/KWh	5.5
Expected VERs price	€/ tCO2-eq	5
EURO/USD [40]	-	1.4872

The main parameters and items have been considered in the table above for the cash inflow and cash outflow of the Project.

(i) The cash inflow or income stream

The primary legislation for a reasonable projection of income stream is the "Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (No.5346)". According to Article 6 of the Law, the price to be applicable to the electrical energy to be purchased within the scope of Law for each year shall be the Turkish average wholesale electricity price in the previous year determined by the Energy Market Regulatory Agency (EMRA). This applicable price may not be less than the Turkish Lira equivalent of 5 euro cent per KWh and may not be more than the Turkish Lira equivalent of 5.5 Eurocent per KWh. However legal entities (project participant) that hold licenses based on renewable energy resources and which have the opportunity to sell above the limit of 5.5 Eurocent per KWh in the market shall benefit from this opportunity.

We considered 1 USD = 1.41 TL[41] and 1 EURO = 2.10 TL (exchange rate/selling). When the annual electricity generation was taken as 20322.5 MWh, in the case of selling the generated electricity with the price of 5.5 Eurocent/KWh [42], **2,867,911.71 USD** will be earned. It is assumed constant selling price of electricity during the 49 years of operation.

In the framework of Project, the Government gave guarantee to proposed project to buy 100 percent of power to be generated from power plant only first ten years. After the first 10 yearly periods, electricity sales prices and amounts will depend on electricity market condition. As it can be seen above, main assumption (conservative approach) is to adopt the same income stream projections in both the first 10 years and following 40 years. Besides, there is no export competence in the scope of license and the Project is derived from regional market potential (EU etc.). Hence, the income stream projections are based on rather the conservative assumptions.

(ii) The cash outflow and costs (investment costs & operational costs)

Costs can be classified into two categories: Investment costs and operational costs. DSI unit prices is used (except electromechanical equipments) in investment cost calculations. The total project cost, VAT, financial cost and investment costs are itemized as follows:

Table 10: Çay Weir and HEPP Project and Investment Costs (USD)

Units	Total	References of Inputs

[40] The exchange rate on September 1,2008 was used for conversion to be in line with the feasibility study, http://www.tcmb.gov.tr/
[41] Defined value by State Hydraulic Works, retrieved from conducted Çay Weir and HEPP Feasibility Study Report, section 8-1
[42] The conservative approach is preferred with the highest earning amount.

Derivation and Cofferdams	100,000	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Weir	1,778,425	Çay Weir and HEP, Feasibility Study Report, Table 9.1
Transmission Tunnels	23,024,293	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Surge chamber	1,098,730	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Penstock	600,927	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Powerhouse	1,232,217	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Permanent project site construction	307,397	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Roads	2,000,000	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Switch Yard	200,000	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Construction Works Cost TOTAL	30,341,989	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Electro mechanic Equipments	4,098,751	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Estimated Cost TOTAL	34,440,740	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Unforeseen cost	3,239,136.45	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Energy Transmission Line	140,000	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Plant Cost TOTAL	**37,819,876.45**	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Survey-engineering cost	3,337,618.79	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Land acquisition	500,000	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
PROJECT COST	**41,657,495.24**	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
Interest During Construction	5,805,398	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
TOTAL INVESTMENT COST	**47,462,893.24**	Çay Weir and HEPP, Feasibility Study Report, Table 9.1
VAT	6,760,573.96	VAT is 18% as per the VAT Law (no: 3067, date: 25/10/1984)
TOTAL INVESTMENT COST + VAT	**54,223,467.20**	The summation of two row above.

Note: Please follow the IRR calculations excel sheet for more details.

In accordance with the conducted Feasibility Study Report of the proposed project, the expense of operation and maintenance is tabulated below;

Units	Operation and Maintenance Cost (USD)[43]
Derivation and Cofferdams	550
Weir	19,563
Transmission Tunnels	126,634
Surge chamber	6,043
Penstock	6,610
Powerhouse	27,109
Permanent project site construction	3,381
Roads	22,000
Switch Yard	8,800
E/M	64,555
Energy Transmission Line	2,100
TOTAL	**287,345**

Note: Please follow the IRR calculations excel sheet for more details.

(iii) Earnings before Interest, Depreciation (EBITD)

[43] Çay Weir and HEPP, Feasibility Study Report, Table 9.2/ the 10th column

These gross earnings figures are tabulated and included in the accounts and stated in the IRR excel sheet briefly.

(iv) Depreciation

Depreciation related to the project, which has been deducted in estimating gross earnings on which tax is calculated, added back to net profits in line with the suggestion in the tool "Demonstration and assessment of additionality, version 06.0.0", EB 65.

(v) Interest Expenses

Interest expenses are applied with respect to expected credit conditions on the year of feasibility study applied.

(ix) Netting of Input VAT

Project participant has the right to deduct input VAT of investment cost. Paid input VAT in the investment period is deducted the VAT amount in the following years.[44] VAT is 18% of the project cost of units except electro mechanical equipment cost as per the VAT Law (no: 3067, date: 25/10/1984). The deduction is calculated as the 18% of income annually.

(x) Instalment Payment

Repayments of principal are tabulated and included in the accounts and stated in the IRR excel sheet briefly.

(xi) Net Cash Flow

Net Earnings + Depreciation + Netting of VAT – Instalment Payment

(xi) Net present value (NP) and Equity IRR

For a given series of net cash flows (the difference between the present value of cash inflows and cash outflows), Equity IRR of the Çay Weir and HEPP Project 4.96% is the discount rate that results in an NPV of zero (without considering the carbon revenue).

With respect to "Guidelines on the Assessment of Investment Analysis", version 04; the fair value of project activity assets at the end of the assessment period should be included as a cash inflow in the final year. Hence, the fair value was calculated in accordance with local accounting regulations and included as a cash inflow in the final year.

However, as per *4628 numbered Law* of Turkish Legislations, at the end of electricity production license as of 49 years, the project activity with all units shall be granted to government with no salvage value. Hence, in reality, the salvage value of project activity assets will be not be given to investor.

[44] Please see the excel sheet of IRR analysis.

When we consider to today's technology, high capital stock will be transferred from Project to the public contributing to public welfare. Therefore, this salvage value can be seen positive impact on community (public utility) in terms of sustainability development matrix.

(xii) Equity IRR, VER income and the Benchmark

As is mentioned above, Equity IRR has been calculated as 4.96% without considering the carbon revenue. When benchmark IRR is taken as 15%, the Project is not financially attractive. We consider 5 EURO (6.6 USD) VER Sales Unit Price (conservative prediction) and taxation. When we include the carbon revenues in the cash flows, the Equity IRR increases to nearly 5.29 %. The IRR even with VERs remains lower than the benchmark of 15%.[45]

Sub-step 2d: Sensitivity Analysis

Sensitivity analysis is used to determine how different values of independent variables will impact dependent variables under a given set of assumptions. This subchapter can cover a diversity of complexities and difficulties that may arise in an investment analysis, including issues of electricity generation, electricity price, and corporate tax and other financial burdens, electricity demands etc. The aim is to bring to the attention of persons concerned a number of issues that are known in cash flows circles and IRR calculations.

Independent variables and accepted affecting IRR as a dependent variable is assessed below.

(i) The cash inflow or income stream

- Constant selling price of electricity during the 47 years of operation (2 years construction period)

1 USD = 1.41 TL and 1 EURO = 2.10 TL (exchange rate/selling).

Independent variables affecting pricing: The price level in the market is mostly determined by the Government as the main driver. Due to slow progress in market liberalization, there may not be change in this situation in short and medium term. It is generally expected that the public sector borrowing requirement (PSBR) to be rise, pressure on the level of electricity price to increase. After the global crises, Turkish Government's manoeuvring ability within the budget is very limited. Moreover, significant opposition from consumers (household, industry etc.) may meet the increasing electricity price. Therefore, price movement may remain flat in the coming years.

On the other hand, privatization of the important parts of Turkey's Electricity Distribution Industry has carried out recently. The privatization of electricity distribution companies will aid the fight against illegal electricity usage in Turkey. The rate of illegal electricity usage in Turkey increased from 14.4 percent to 17.7 percent from 2008 to 2009, according to the recent data from the Turkish Electricity Distribution Company (TEDAŞ). Therefore, increased energy costs to consumers and public fall. As the rate of illegal electricity usage decreases, institutional structure

[45] Please see the excel sheet of IRR analysis.

of market; transparency is strengthening. Right price signals lead to efficient choices among existing alternatives for consumer, producer and the Government.

- Constant annual generation of electricity during operation period

Independent variables affecting generation: The two independent variables were considered. First are the climatic conditions and catastrophic risks. As it is known, the estimated electricity generation based on historical hydrological data. Big deviation can be seen in the context of global climate change. Therefore, these effects on generation may be negative or positive. Both of them are risks on the proposed project. Second is the constituted water usage agreement between Project participant and DSİ (The State Hydraulic Works). According to the agreement, DSİ can always pump from the Creek for agricultural irrigation and fresh water. This means decreasing generation and income for the project.

- It is assumed that annual generation (100%) will be sold during the 50 years of operation. It is not considered the demand conditions of electricity market. Besides, there is no export competence in the scope of license and the Project is derived from vast market potential (EU etc.).

Independent variables affecting the demands: To assess the predictions for demands of using more realistic assumptions, it is needed to develop a framework of multi dimensional analysis. For instance, growth scenarios, a short and long run the price and income elasticity of demand for electricity etc. are main subjects.[46] There is no doubt that it is not possible to handle the dimensions with all its aspects. We only underline importance of GDP and industrial (especially manufacturing) sector in the demand context.

In Turkey, growth rate is an important variable which affected the electricity consumption positively in the long term.[47] Export-led growth as model is valid in Turkey.[48] The growth performance predominantly depends on global demand and falling global demand could have a major impact. Industry (especially manufacturing) with input-output connections is also the key sector in terms of growth performance and constituted more than 40% of total Turkey electrical consumption. Therefore, the electricity demand conditions of domestic market are drastically affected by the global economy cycles. On the other hand the largest elasticity is found in industry. Household demand for electricity is much less elastic than industrial energy use.[49] After the first ten years, income stream of Project will be able to fluctuate.

(ii) The cash outflow and costs

[46] The price elasticity of demand is, by definition, the percentage change in demand that is caused by a one per cent change in price. This definition is also validated for the income elasticity.

[47] KAPUSUZOGLU, Ayhan and KARAN, Mehmet Baha (2010), "An Analysis of the Co-integration and Causality Relationship between Electricity Consumption and Gross Domestic Product (GDP) in the Developing Countries: An Empirical Study of Turkey", *Business and Economics Research Journal, Volume* 1, Number 3.

[48] BİLGİN, Cevat and SAHBAZ, Ahmet (2009): "Türkiye'de Büyüme ve İhracat Arasındaki Nedensellik İlişkileri", published in *Gaziantep Üniversitesi Sosyal Bilimler Dergisi*, Vol. 8, No. 1 (2009): pp. 177-198. This paper is to investigate the relations between export and growth for Turkey by using 1987-2006 monthly data. According to the test results, export-led growth is verified for the specified period.

[49] ACKERMAN, Frank, (2008). "Carbon Markets and Beyond: The Limited Role of Prices and Taxes in Climate and Development Policy," *G-24 Discussion Papers 53*, United Nations Conference on Trade and Development.

- Independent variables affecting investment costs: Especially important differences between predicted construction costs and realized construction costs can be revealed in disfavor and favor of the Project.

Independent variables affecting operational costs: Constant annual wages during the 50 years of operation is assumed. In other words, it is not considered possible reel wage increases and decreases. Indeed real wages that have been adjusted for inflation is more than predicted (constant) level in order to prosperity over time. The possible changes of wages, and other current expenses, the fiscal liabilities (especially levied by the local administration) are not considered in baseline analysis.

Despite possible limitations –especially in absence of compound effects and probability distribution– this sensitivity analysis provides a general outlook of the investment analysis effort. A range of 10% fluctuations in parameters (electricity price and costs) can be taken in this analysis.

Table 11: The Sensitivity Analysis for Çay Weir and HEPP Project (without carbon revenue)

Parameter	Variation	IRR
Cost	increased 10%	4.12%
	decreased 10%	5.97%
Income	increased 10%	5.87%
	decreased 10%	4.04%
Electricity generation	increased 10%	5.87%
	decreased 10%	4.04%
Amount of electricity generated	increased 10%	5.87%
	decreased 10%	4.04%

The income has two variables; amount of electricity generated and unit price of electricity.[50] Therefore, income can be a parameter just by the way of variation in these 2 variables, which means that the increase in income can be a result of either increase in amount of electricity generated or increase in unit price of electricity. The decrease in income can be a result of either decrease in amount of electricity generated or decrease in unit price of electricity.

It may be seen from the sensitivity analysis that the 49 years Equity IRR value for the proposed project activity is less than the benchmark IRR (15%). Likewise, this analysis has not been considered macro risks (a projection about budget deficits, current account deficits, saving deficits, public and private debt stock etc. of Turkey economy) as well as micro risks (project, sectoral etc.).

Outcome of Step 2:

[50] Income = electricity generated (KWh) x unit price of electricity (USD/KWh)

The investment and sensitivity analysis shows that the VER revenues will improve the Equity IRR and make the project more attractive for investors. Considering that figures above do not precisely reflect the investment risk (systematic and unsystematic risks) the role of the carbon income is significant to enable the project to proceed and for a favourable investment decision taken. Based on the analysis and information above, it is concluded that project is not the attractive and can be considered as additional to the baseline scenario for indicated benefits in the first chapter.

The milestones of the project are given below:

Table 12: Milestones of the Project

TASK NAME	DATES
Feasibility Study Report submission	May 2009
Contract with EN-ÇEV (the Consultant of Carbon Credits)	August 2011
Project Introductory Report Approval	20/01/2011
Licensing by EMRA	16/03/2011
Turbine Contract – investment decision date	25/08/2011
Transmission tunnel construction contract	20/10/2011
Hydro mechanical equipment contract	17/04/2012
Construction Starting Date	March 2012
Operation Starting Date	September 2014

Step 3: Barrier analysis

The barrier analysis step has not been applied for the proposed project.

Step 4: Common practice analysis

The step 4 of "Demonstration and assessment of additionality, version 06.0.0" was applied for common practice analysis. This section includes the analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region.

The following Sub-steps discuss the existing common practice.

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

The number of electricity production licenses have been issued for hydro power plants by EMRA (Electricity Market Regulation Agency) [51] on the date 23/04/2012 is 849. A list of production licenses is published at the official EMRA web site.[52] The list was analyzed to identify the scale of HEPP moreover, whether they are in operation. Accordingly, 277 (32.62%) of these are in

[51] In Turkish; EPDK; Enerji Piyasası Denetleme Kurumu
[52] Retrieved from http://www2.epdk.org.tr/lisans/elektrik/lisansdatabase/verilentesistipi.asp

operation. The 119 of 277 are large scale, 76 of 277 are small scale, 82 of 277 are micro-scale hydro power projects.

Table 13: The total number of HEPPs issued by EMRA, in operation, in construction and recently issued without starting construction yet

	In operation	In construction or recent issuance	Total	The number of HEPPs submitting the construction ratio
Small Scale	76	229	305	204
Large Scale	119	203	322	215
Micro Scale	82	140	222	124
Total	277	572	849	543

The number of ongoing construction or recently issued licenses is 572 (67.37%) as per same list of EMRA.

The HEPPs have to submit their construction ratio to EMRA in every six months. The construction details of this list can be followed from the list developed by EMRA on the submission of the completion ratio of privately owned HEPPs[53]. In January 2012, the owners of 543 HEPPs were submitted the ratio of construction and the figures are listed at the web of EMRA[54].

A wrapped up version of this list by the scales based on installed capacities of HEPPS can be found below.

Table 14: The number and percentage of HEPP facilities licensed to private production companies with a certain construction completion ratio[55]

	The number of HEPPs submitting the construction ratio	Over 50% construction realization	The percentage of HEPP over 50% constructed	Over 75% construction realization	The percentage of HEPP over 75% constructed	Lower than 25% construction realization	Percentage of HEPP construction ratio lower than 25%
Small Scale	**204**	43	21.08%	27	13.24%	111	54.41%
Large Scale	**215**	48	22.33%	28	13.02%	91	42.33%
Micro Scale	**124**	13	10.48%	7	5.65%	69	55.65%
Total	**543**	104	19.15%	62	11.42%	271	49.91%

As is seen from the percentages, the 19.15% (104/543) of HEPPs (submitted completion ratio) were just complete construction with a ratio 50%. This percentage increases to 21.08% (43/204) when small scale HEPP projects are the subject. Recently, there are accumulated installed capacities of HEPPs those are under construction in Turkey. The completion ratio over 75% is

[53] Note that, EÜAŞ has no HEPPs in construction phase, all in operation.
[54] Retrieved from http://www2.epdk.org.tr/lisans/elektrik/proje/yenilenebilir.xls
[55] Retrieved from http://www2.epdk.org.tr/lisans/elektrik/proje/yenilenebilir.xls

more threatening, 13.24% (27/204) of small scale HEPP projects and 11.42% (62/543) of total HEPPs under construction are the percentages calculated. The lower percentage of higher completion rates of HEPPs can be obviously observed by the way of table above.

The higher ratio of lower completion rates is remarked at the right row of the same table. The ratio of construction lower than 25% precisely can be valid for the 54.41 (111/204) % of small scale HEPP projects and 49.91% (271/543) of whole HEPP projects.

The construction phase generally last longer than what was defined at the feasibility study before. The reason of this can be the unexpected conditions which cannot predicted before, higher work load, topographical conditions, problems in design, changes in design, problems of employees or climatic conditions etc. The reasons may base on the inexperienced and copied designing of HEPPs which result in the obstruction of development of HEPP project easily and becoming wide-spread. By this sense, the electricity generation from HEPP business is not a common practice.

As a part of its energy policy, Turkey started a liberalization process in its electricity market in 90's. Formerly, all energy plants but especially the HEPPs have been built and operated by the State. EUAŞ – Electricity Generation Company was responsible from increasing of installed capacity of Turkey. The liberalization process commenced with electricity production although is not completed yet, however full privatization of state-owned distribution assets is completed.

Participation of private sector in the electricity generation from hydro-electrical power plant market is a new concept in Turkey. Since, the increasing energy demand cannot be afforded by the State in consequence of the high investment and operation cost of required additional power plants, the State started to outsource the construction of those plants through licenses at 2001. The aim is to face the growing demand for electricity and provide the capital to realize hydro investment. Until the renewable energy law was enacted in 2001, the companies had not been responsible for the whole process (planning and financing of the project, choosing the technology and operating of HEPPs) and not taken all the risks.

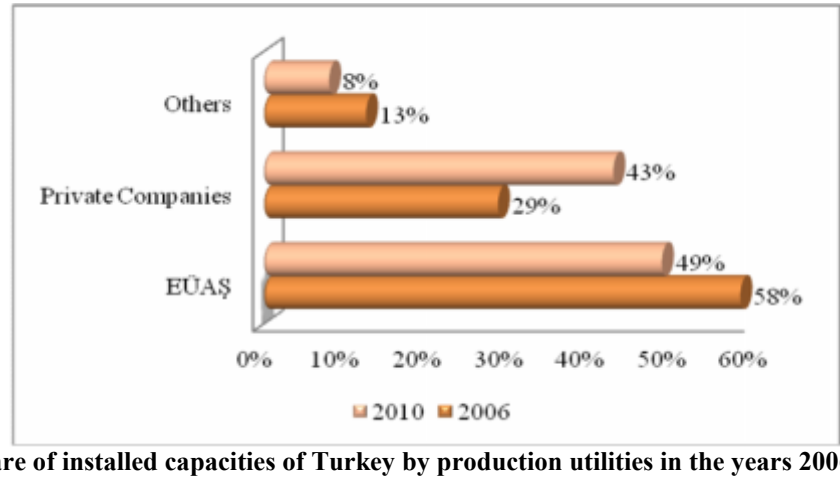

Figure 4: The share of installed capacities of Turkey by production utilities in the years 2006 and 2010[56]

[56] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kguc(1-12)/6.xls

The share of capacity of EÜAŞ to the total installed capacity of Turkey is 49% in the year 2010 which was 58% in the year 2009. The figure above expresses the development of private sector contributed installed capacity of Turkey between the years 2006-2010.

Another table shows; the diffusion of private sector to electricity production sector and tabulates the installed capacities of Turkey contributed by private companies for thermal and renewable resources within the last 4 years.

Table 15: Annual development of Turkey's installed capacity produced by private companies and the share of Renewable Energy capacity development by private companies to Turkey's installed capacity. (MW) [57]

		2007	2008	2009	2010
Installed Capacity by Private Production comp	Thermal	10,688.80	11,208.90	13,421.00	16,273.20
	Hydro + Geothermal + Wind	1,624.30	2,181.50	3,168.70	4,992.20
	Total	12,313.10	13,390.40	16,589.70	21,265.40
	The percentage of renewable energy resourced installed capacity in total installed capacity (%)	13.20	16.30	19.10	23.48
Total Installed Capacity of Turkey	Thermal	27,271.60	27,595.00	29,339.10	32,278.50
	Hydro + Geothermal + Wind	13,564.10	14,222.20	15,422.10	17,245.60
	Total	40,835.70	41,817.20	44,761.20	49,524.10
	The percentage of renewable energy resourced installed capacity in total installed capacity (%)	33.20	34.00	34.50	34.82
The percentage of renewable energy resourced installed capacity of private production companies to Turkey's total renewable energy sourced installed capacity (%)		12.00	15.30	20.50	**28.95**
The percentage of renewable energy resourced installed capacity of private production companies to Turkey's total installed capacity (%)		3.98	5.22	7.08	10.08

To sum up, the contribution of renewable energy produced by private production companies to Turkey's total renewable energy production is 28.95 % in 2010. Most of the private companies in Turkey have little experience and know-how on the management and operation of HEPPs - also renewable energy sources -. Moreover, the private companies that invest in HEPPs in Turkey are generally active in other sectors like textile, cement etc.[58] The lower ratio express that the renewable energy contributed to installed capacity of Turkey by privates companies is a new concept for Turkey and is not a common practice.

In addition to that, thermal power generation is still preferred by both private and state owned companied in Turkey. The Figure 5 shows that thermal power plants have shown a rapid growth in parallel with the demand for electricity whereas hydroelectric power generation has grown at a far slower rate. Furthermore, the ratio of installed capacity resourced from hydro power and thermal power to Turkey's total installed capacity having an inverse relationship can be seen in Figure 6 below.

[57] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kguc(1-12)/6.xls

[58] Retrieved from http://e-imo.imo.org.tr/Portal/Web/new/uploads/file/menu/HESRapor.pdf

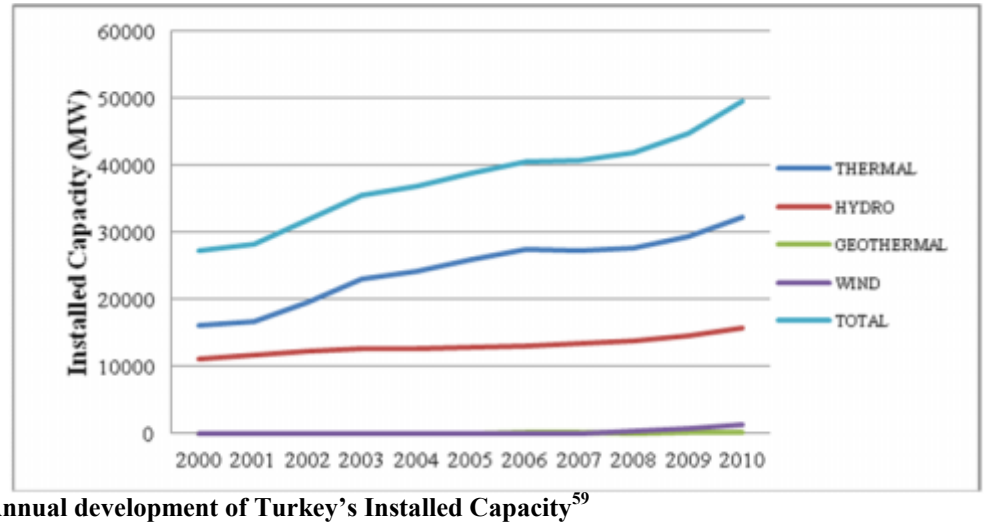

Figure 5: Annual development of Turkey's Installed Capacity[59]

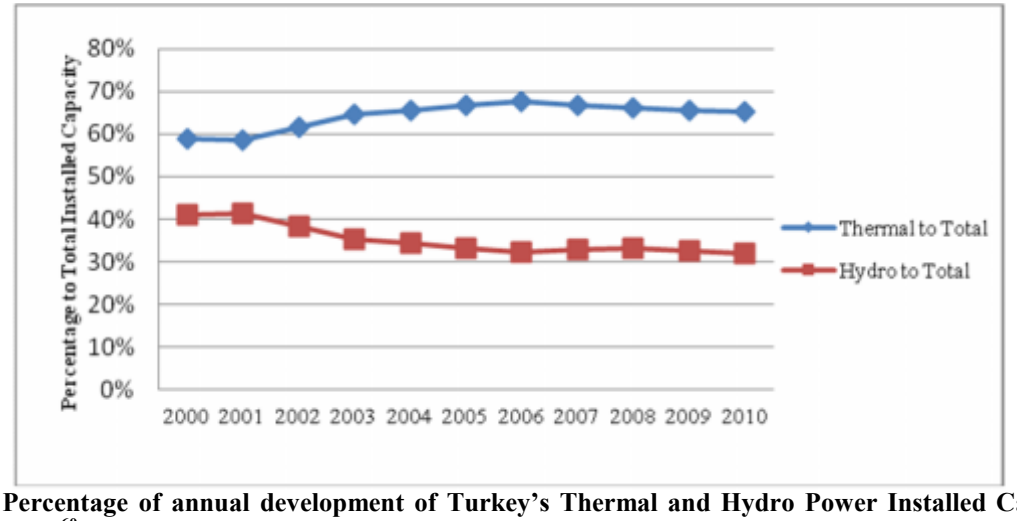

Figure 6: Percentage of annual development of Turkey's Thermal and Hydro Power Installed Capacity to Total Capacity [60]

The preference of thermal power projects and the increasing percentage indicate that, the hydro power is not a common practice for Turkey.

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

There may be problems which cannot be predicted before the implementation of construction because of the lack of experience of HEPP projects. Hence, there may be difficulties in completing the project which prevent the spread of HEPP projects. The participation of private sector in the electricity generation from hydro-electrical power plant market is a new concept in turkey. These inexperienced companies expect to have high profits. However, due to various limitations or unforeseen problems, the completion of the project is delayed. Because of this risky situation, thermal/natural gas power generation is still preferred by private companies in

[59]Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kguc(1-12)/3.xls

[60] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kguc(1-12)/3.xls

Turkey in spite of the incentives given to renewable energy resourced power generation facilities. In Turkey, the legal and financial incentive mechanisms are found inadequate for investors and NGO's.[61] [62] For these reasons, the completion ratio of current investments is very low.
Besides the lower completion ratio of projects, there are mercantile risks with respect to recent amendments in financial market, credit availability/compression and political uncertainty.

In this regard, the preference of non-renewable power generation and difficulties in completion of projects indicate that, the small or large scale hydro power is not a common practice in Turkey. Obviously, the VER revenues alleviate the financial obstacles and affect the investor positively.

Furthermore, the low contribution of hydro power projects to total installed capacity of Turkey and similar HEPP projects which benefit from VER revenues corroborate that electricity generation from hydro power is not a common practice, especially without considering VER revenues.

Outcome of common practice analysis:

As a result, the low rate of completion of the projects, the low contribution privately held hydro projects and also the implementation of the same type of projects in the same region with VER revenues confirm that the barriers elaborated above decrease or limit the investments to HEPPs and other renewable energy sourced power plants. This in turn shows that the electricity generation from HEPP business is not a common practice in Turkey. Therefore Step 4 is satisfied and the proposed project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The emission factor has been calculated in a conservative manner as requested by the applied methodology; AMS-I.D "Grid Connected Renewable Electricity Generation, version 17" EB 61 and the tool used to calculate the combined margin emission factor; "Tool to calculate the emission factor for an electricity system, 02.2.1" EB 63.

According to the methodology, the baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity and the calculations is as follows;

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

Where:

BE_y = Baseline Emissions in year y (tCO_2/yr)

[61] Renewable Energy Project, WWF, 2011, http://www.wwf.org.tr/pdf/yenilenebilirenerjiproje.pdf
[62] Ela Uluatam, TOBB, *AB Proje Geliştirme ve İzleme Müdürlüğü,* http://www.tobb.org.tr/AvrupaBirligiDairesi/Dokumanlar/Raporlar/YenilenebilirEnerjiTesvikleri.pdf

$EG_{PJ, y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity (MWh/yr)

$EF_{grid, CM, y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"[63] (t CO_2e/kWh)

For calculating $EG_{PJ, y}$, the fact that the proposed project is a Greenfield energy power plant is considered. Hence, the following equation is used where, $EG_{facility, y}$ is *the quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).*

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

The $EF_{grid,CM,y}$ calculation is based on the latest version of the *"Tool to calculate emission factor of an electricity system."*

Basic assumptions made are;

- Based on selection of ex-ante option, emission factor remains same over the crediting period,
- Emission factor of fuels sources is retrieved from IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Volume 2 (Energy) of the 2006 IPCC Guidelines for National Greenhouse Gas Inventory.

In calculating the operating margin ($EF_{grid,OM,y}$), project developers have the option to select from four potential methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

Options (b) and (c) are not preferred due to the scarcity of data for Turkey. Option (d) is not preferred since low-cost/must run resources do not constitute more than 50% of total grid generation. As described in the tool, the Simple OM (a) can only be used if low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Low-cost/must run resources consist of hydro, geothermal, wind, low-cost biomass, nuclear and solar which are used for power plants with low marginal generation costs or power plants and dispatched independently of the daily or the seasonal load of grid. There is no indication that coal is used as a must-run and no nuclear energy plants are located in Turkey. The following table shows the share of low-cost/must-run production for the last 5 years. The low-cost/must run resources constitute less than 50% of total grid generation in average of the five most recent years, 21.43 %. Therefore the requirements for the use of the Simple OM calculations (option a) are satisfied.

Table 16: Total electricity generation and from low-cost/must run resources (2006-2010)[64]

[63] The latest version 02.2.1 is used for the proposed Project.

[64] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/40(06-10).xls

Electricity Generation (GWh / Year)	2006	2007	2008	2009	2010
Thermal Total	131835.1	155196.17	164139.3	156923.44	155827.61
Hydro + Geothermal + Wind Total	44464.7	36361.92	34278.7	37889.47	55380.11
Turkey's Total	176299.8	191558.09	198418	194812.92	211207.73
Share of low-cost/must-run production	25.22	18.98	17.28	19.45	26.22
Average share of low-cost/must-run (%)	**21.43**				

Ex-ante option is chosen to calculate the simple OM. The calculations based on ex-ante option to determine $CO_{2\text{-eq}}$ Emissions are expressed in B.6.3, step 3.

Furthermore, the capacity addition is composed of the set of power units in the electricity system added to the Turkey's capacity between 2006 and 2009. Since the generation is not sufficiently large to meet the 20% of total generation at 2009 as requested in the methodology, the capacity generations of 7 plants with latest starting date to operation at 2005 should be added to the set of power units. After this addition, the capacity addition is used to calculate the build margin emission factor. (see B.6.3, annex 3)
Besides, the additionality assessment of the project activity has been demonstrated using the "*Combined tool to identify the baseline scenario and demonstrate additionality version 04.0.0*" and the *"Demonstration and assessment of additionality, ver. 06.0.0"*.

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	**EGy**
Data unit:	GWh
Description:	Net electricity generated and delivered to the grid by all power sources serving the system, excluding low-cost/must-run units/plants, in year y
Source of data used:	TEIAS (Turkish Electrical Transmission Company) Annual development of Turkey's gross electricity generation of primary energy sources between year 1975 and 2009, Annual development of electricity generation-consumption-losses in Turkey between year 1984 and 2009. http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/35(75-10).xls
Value applied:	Table 17, Table 19
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ''Turkish Statistics Law and Official Statistics Program'' TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	

Data / Parameter:	**$EG_{y,Çay\ Weir\ and\ HEPP}$**
Data unit:	MWh

Description:	Net Electricity delivered to the grid by Çay Weir and HEPP project in year y
Source of data used:	Çay Weir and HEPP, Project Introductory File
Value applied:	35061
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used for emission reduction estimation
Any comment:	

Data / Parameter:	**$EF_{grid, OM simple, y}$**
Data unit:	tCO_2/MWh
Description:	Simple operating margin CO_2 emission factor in year y
Source of data used:	Calculated by formula (1)
Value applied:	0.656512774 by Table 20
Justification of the choice of data or description of measurement methods and procedures actually applied :	The used data in formula is taken from justified sources as is seen from other tables in part B.6.2 of this PDD.
Any comment:	

Data / Parameter:	**$FC_{i, y}$**
Data unit:	m^3 / tons (m^3 for gaseous fuels)
Description:	Amount of fossil fuel consumed in the project electricity system by generation sources in year *y*
Source of data used:	TEIAS (Turkish Electricity Transmission Company) Fuels consumed in thermal power plants in Turkey by the electric utilities for year y http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/29(06-2010).xls
Value applied:	Table 18
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ‘‘Turkish Statistics Law and Official Statistics Program’’ TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	

Data / Parameter:	**Heat Value**
Data unit:	TJ
Description:	Amount of heat produced by the consumption of a unit quantity of fuel types consumed in thermal power plants
Source of data used:	TEIAS (Turkish Electricity Transmission Company) Heating values of fuels consumed in thermal plants in Turkey by the electricity utilities (2008-2010) http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/49.xls
Value applied:	Table 18
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ‘‘Turkish Statistics Law and Official Statistics Program’’ TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available. Heat value is divided by FC to determine NCV.(The formula is taken from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 1 of Volume 2,Box 1.1)
Any comment:	1J = 0.238846 cal.

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	GJ/tonnes
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data used:	TEIAS (Turkish Electricity Transmission Company) Heating values of fuels (HV) are divided by amount of fuel consumed (FC) in thermal plants in Turkey by the electricity utilities (2008-2010) to determine net calorific values (GJ/tonnes)
Value applied:	Table 18
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ‘‘Turkish Statistics Law and Official Statistics Program’’ TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	In order to convert the data source units to the required units; 1J = 0.238846 cal. and the density of natural gas is considered to be 0.695kg/m^3

Data / Parameter:	**$EF_{C02,i,y}$**
Data unit:	T CO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* in year *y*
Source of data used:	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 and Annex 1 for sub-bituminous of Chapter 1 of Volume 2 (Energy) of the 2006 IPCC Guidelines for National Greenhouse Gas Inventory http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.htm

Value applied:	Table 18, Table 22, Table 23
Justification of the choice of data or description of measurement methods and procedures actually applied :	There is no information on the fuel specific default emission factor in Turkey, hence, IPCC values has been used as referred in the ‘‘Tool to calculate the emission factor for an electricity system, version 02.2.1’’.
Any comment:	

Data / Parameter:	**$EF_{grid, BM, y}$**
Data unit:	tCO2/MWh
Description:	Build margin CO_2 emission factor in year y
Source of data used:	Calculated by equation 3 at Table 24
Value applied:	0.55910978
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated *ex-ante* and comprised capacity addition of power plants between years 2006-2010 according to the “Tool to calculate emission factor for an electricity system, version 02.2.1”
Any comment:	

Data / Parameter:	**$EF_{EL, m, y}$**
Data unit:	tCO_2e/MWh
Description:	CO_2 emission factor of power unit *m* in year *y*
Source of data used:	Calculated by equation 4
Value applied:	Table 24
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated *ex-ante* according to the “Tool to calculate emission factor for an electricity system” version 02.2.1, EB 63 Annex 19.
Any comment:	

Data / Parameter:	**$\eta_{m, y}$**
Data unit:	-
Description:	Average net energy conversion efficiency of power unit m in year y
Source of data used:	Tool to calculate the emission factor for an electricity system, ver. 02, Annex 1 (after 2000)
Value applied:	Table 21, Table 23
Justification of the choice of data or	Since there is no current efficiency values of power units in Turkey, the efficiency values o are retrieved from Tool, ver. 02.2.1, Annex 1.

description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**$EG_{m, y}$**
Data unit:	GWh
Description:	Net quantity of electricity generated and delivered to the grid by power unit *m*, in year *y*
Source of data used:	TEIAS (Turkish Electrical Transmission Company) Turkey's Gross Electricity Generation By Primary Energy Resources And The Electric Utilities (2006-2010) http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/40(06-10).xls
Value applied:	Table 23, Table 24
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ‘‘Turkish Statistics Law and Official Statistics Program’’ TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available. The electricity generation from all different sources included in capacity addition used in the equation 3.
Any comment:	

Data / Parameter:	**$EF_{grid, CM, y}$**
Data unit:	tCO_2e/MWh
Description:	Combined margin CO_2 emission factor in year *y*
Source of data used:	Calculated data applied to the equation 5
Value applied:	0.60781127
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated *ex-ante* according to the “Tool to calculate emission factor for an electricity system, version 02.2.1”, EB 63 Annex 19.
Any comment:	

Data / Parameter:	**Electricity Imports**
Data unit:	GWh
Description:	Electricity transfers from connected electricity systems to the project electricity system by years (2007-2009)
Source of data used:	TEIAS (Turkish Electrical Transmission Company) Annual Development of Turkey’s Gross Electricity Generation by the

	Electricity Utilities and Export-Import Gross Demand (2006-2010) http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/29(06-2010).xls
Value applied:	Table 19
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ‘‘Turkish Statistics Law and Official Statistics Program’’ TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	

Data / Parameter:	**Capacity additions**
Data unit:	Name of the plant; Installed capacity (MW); Fuel type; Generation (GWh);
Description:	Capacity additions to the grid that comprises 20% of the total generation (2005-2009)
Source of data used:	TEIAS (Turkish Electricity Transmission Company) Generation units put into operation in 2005;2006;2007;2008;2009 Capacity Projection Report 2010-2019, Annex-2, for 2009 http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf Capacity Projection Report 2009-2018, Annex-2, for 2008 http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf Capacity Projection Report 2008-2017, Annex-2, for 2007 http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2008.pdf Capacity Projection Report 2007-2016, Annex-2, for 2006 http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202007.pdf Capacity Projection Report 2006-2015, Annex-2, for 2005 http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202006.pdf
Value applied:	Annex 3; Table 26 - Table 30
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ‘‘Turkish Statistics Law and Official Statistics Program’’ TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available. Since the summation of capacity additions between 2006 and 2009 are not sufficiently large, the capacity generation of 7 plants with latest starting date to operation at 2005 should be added to meet the %20 of total generation at 2009.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

In respect of United Nations approved small scale methodology AMS-I.D “Grid Connected Renewable Electricity Generation, version 17”, the baseline scenario is defined as *the consolidation of electricity delivered to the grid by the project activity and electricity generated by the operation of grid-connected power plants in Turkey and electricity produced by the new*

generation sources as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system, ver 02.2.1".

The emission factor is determined as follows; a combined margin (CM), combining the operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system, version 02.2.1" by seven steps;

Step 1: Identification of the relevant electricity system

According to the "Tool to calculate the emission factor for an electricity system, ver. 02.2.1" , a *project electricity system* should be defined by spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints. Hence, the *project electricity system* comprises of the Çay Weir and HEPP project and all power plants attached to the Interconnected Turkish National Grid.

A *connected electricity system*, e.g. national or international is defined as electricity that is connected by transmission lines to the project electricity system. For the case of the project "the project electricity system" and "the connected system" are the same. As also confirmed by TEIAS (Turkish Electricity Transmission Company Inc.), the Turkish transmission system is interconnected. [65] There is an independent regional grid system neither in Kastamonu nor in the West Black Sea Region. Hence, the connected electricity system comprises of the Çay Weir and HEPP and all power plants connected to the Interconnected Turkish National Grid.

In addition to this, since DNA in the host country did not publish a delineation of the project electricity system and connected electricity system, the suggested criteria at "Tool to calculate the emission factor for an electricity system, ver. 02.2.1" shall be examined. The following criteria can be used to determine the existence of significant transmission constraints:

1. In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 percent between the systems during 60 percent or more of the hours of the year;

2. The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

Since, the project output is fed to the Turkish electricity grid which does not involve any distinct electricity system that applies different price; the first criterion is not applicable. Besides, the transmission line which links the proposed power plant to the nearest substation will be built within the scope of the project and information on grid capacity utilization do not exist. That's why; second criterion is not applicable as well.

In this respect, it is difficult to conclude with a significant transmission constraints or grid boundary.

[65] Türkiye Elektrik Enerjisi 10 Yıllık Üretim Kapasite Projeksiyonu (2010-2019), TEIAS, page 4

On the other hand, as suggested in "Tool to calculate the emission factor for an electricity system, ver. 02.2.1", *"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-Turkey. As a result, the National Electricity Grid of Turkey was used as project boundary -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.

Electricity transfers from connected electricity systems to the project electricity system are defined as *electricity imports* and electricity transfers to connected electricity systems are defined as *electricity exports*.

For the purpose of determining the build margin emission factor, the spatial extend is limited to the project electricity system, except where recent or likely future additions to transmission capacity enable significant increases in imported electricity.

For the purpose of determining the operating margin emission factor, as requested by the tool the CO_2 emission factor for net electricity imports from a connected electricity system located in another country ($EF_{grid, import, y)}$ is taken as 0 t CO_{2e}/MWh.

Electricity exports should not be subtracted from the electricity generation data used for calculating and monitoring the electricity.

Step 2: Choose whether to include off-grid power plants in the project electricity system

According to the ''Tool to calculate the emission factor for an electricity system, ver. 02.2.1" project participants may choose between the following two options to calculate the operating margin and build margin emission factors.

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.

For the proposed project, Option I is selected and only grid power plants are included in the calculation.

Step 3: Selection a method to determine the operating margin (OM)

According to the ''Tool to calculate the emission factor for an electricity system, ver. 02.2.1'', in calculating the operating margin ($EF_{grid, OM, y}$), project developers should select the appropriate option from four potential methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

Options (b) and (c) are not preferred due to the scarcity of data for Turkey. Option (d) is not preferred since low-cost/must run resources do not constitute more than 50% of total grid generation. As described in the tool, the Simple OM (a) can only be used if low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.
Low-cost/must run resources include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation which are defined as power plants with low marginal generation costs or power plants and dispatched independently of the daily or the seasonal load of grid. There is no indication that coal is used as a must-run and no nuclear energy plants are located in Turkey. The following table shows the share of low-cost/must-run production for the last 5 years. The low-cost/must run resources constitute less than 50% of total grid generation in average of the five most recent years, 21.43%. Therefore the requirements for the use of the Simple OM calculations (option a) is satisfied.

Table 17: Total electricity generation and from low-cost/must run resources (2006-2010). [66]

Electricity Generation (GWh / Year)	2006	2007	2008	2009	2010
Thermal Total	131835.1	155196.17	164139.3	156923.44	155827.61
Hydro + Geothermal + Wind Total	44464.7	36361.92	34278.7	37889.47	55380.11
Turkey's Total	176299.8	191558.09	198418	194812.92	211207.73
Share of low-cost/must-run production	25.22	18.98	17.28	19.45	26.22
Average share of low-cost/must-run (%)	**21.43**				

According to the ‘‘Tool to calculate the emission factor for an electricity system, ver. 02.2.1’’ it is allowed to select one of the vintages below;

- ***Ex ante option:*** If the *ex-ante* option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emission factor during the crediting period is required. For grid power plants, a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

- ***Ex post option:*** For *ex post* option, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emission factor to be updated annually during monitoring. The year, in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

For this proposed project the ex-ante option is selected. Data for calculating the three year average is obtained from the period 2008 - 2010 which are the most recent data available at the time of preparation of the CDM SSC PDD.

Step 4: Calculation of the operating margin emission factor according to the selected method.

[66] Retrieved from http://www.teias.gov.tr/istatistik2009/37(06-09).xls and http://www.teias.gov.tr/istatistik2009/36(01-05).xls

The simple OM emission factor is calculated as the generation-weighted average CO_2 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.

The simple OM may be calculated by using;

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if;

a) No necessary data available for Option A,
b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known,
c) Off-grid power plants are not included in the calculation.

For the project in question, ***Option B*** is preferred to calculate the simple OM. Since;

- Electricity generation and CO_2 data for individual power units are not available.
- Only renewable power generation are considered as low cost/must run resources.
- Off-grid power plants are not included in calculations.
- The fuel consumptions of different fuel type data for power plants/ units are available from the official source, TEIAS.

Under Option B, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost / must run power plants / units, and based on fuel type(s), and total fuel consumption of the project electricity system, and OM simple is determined as follows;

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}\right)}{EG_y} \quad (1)$$

Where:

$EF_{grid, OM simple, y}$	= Simple operating margin CO_2 emission factor in year y ($t CO_2/MWh$)
$FC_{i, y}$	= Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i, y}$	= Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2, i, y}$	= CO_2 emission factor of fossil fuel type *i* in year *y* ($t CO_2/GJ$)

EG_y	= Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year *y* (MWh)
i	= All fossil fuel types combusted in power sources in the project electricity system in year *y*
y	= the 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) on data vintage in step 3.

The subscript *m* refers to the power plants/units delivering electricity to the grid, **not including low-cost / must-run power plants/units, and including electricity imports to the grid** -electricity imports should be treated as one power plant *m* -.

In order to calculate the OM emission factor, CO_2 emission value is calculated using the equation as below since the 2010 data is not available;

$$\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}\right) \qquad (2)$$

Table 18: Heat Values, FC, NCV and EF_{CO2} values of each fuel source in 2010[67]

Fuel Type	FC (tones)	Heat Value (MJ)	NCV (MJ/kg=GJ/tones)	EF_{CO2} (Kg/TJ = tones/ GJ)
Sub-Bituminous Coal	7,419,703	165,462,568,465.940	22.300	92,800
Lignite	56,689,392	403,969,424,160.177	7.126	90,900
Fuel-Oil	891,782	35,853,232,789.009	40.204	75,500
Diesel-Oil	20,354	876,472,820.523	43.061	72,600
LPG	0	0	0	61,600
Naphtha	13,140	439,859,802.507	33.475	69,300
Natural Gas[68]	21,783,414	813,734,797,956.702	37.356	54,300

The values of 2008 and 2009 can be found in Annex 3 in a tabular form.

In order to calculate the simple OM emission factor, the net electricity generated and delivered to the grid by all sources excluding the low-cost/must run resources is required. However, net generation national data is only available for total of power sources. Due to this fact, the internal consumption ratio is used to identify the net electricity generation by thermal sources. The exclusion of low-cost/must-run generation from the amount of generation supplied to grid gives the generation by thermal sources. The internal consumption of thermal plants is calculated by means of internal consumption ratio. Hence, the thermal power electricity generation excluding internal consumption of plants gives the net generation excluding low-cost/must-run as is followed by

Table 19. After addition of import electricity to net generation, the EGy is obtained.

[67] The references for the official data used in the table can be found in the section B.6.2.
[68] Density of natural gas is taken as 0.695kg/m^3

Table 19: Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year *y* (GWh)[69]

Electricity Generation (GWh)	Supplied to grid	Low-cost/ must -run	Thermal	Internal consumption (%)	Internal consumption of thermal	Net generation (-) low-cost/ must-run	Import	EG y (GWh)
2008	190,551.30	34,278.70	164,139.30	4.4	7,222.129	156,917.171	789.4	**157,706.571**
2009	187,431.30	37,889.47	156,923.44	4.2	6,590.784	150,332.656	812.0	**151144.656**
2010	212,351.50	55,380.10	155,827.60	4.2	6,544.759	149,282.841	1,143.8	**150,426.641**

Table 20: Generated Electricity Weighted Average $EF_{grid, OMsimple, y}$ (tCO_2/MWh)

	2008	2009	2010
	EF grid, OM simple, y, i (tCO_2/MWh)		
Sub-Bituminous Coal	0.08201	0.09024	0.10208
Lignite	0.26100	0.24572	0.24411
Fuel Oil	0.04128	0.03168	0.01799
Diesel Oil	0.00256	0.00368	0.00042
LPG	0	0	0.00000
Naphtha	0.00021	0.00016	0.00020
Natural Gas	0.27235	0.27998	0.29374
Total	**0.65941**	**0.65147**	**0.65854**
3-year generation weighted average (tCO2/MWh)	0.656512774		

$EF_{grid, OM simple, y, i}$ = 0. 6556512774 tCO2/MWh

Step 5: Identifying the group of power units to be included in the build margin

In terms of vintage data, the "Tool to Calculate the Emission Factor for an Electricity System, ver. 02.2.1", provides two options to be chosen. Option 1 was chosen to calculate the build margin emission factor

Option 1 requests that; "*For the first crediting period, the BM emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the BM emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for the renewable of the crediting period to the DOE. For the third crediting period, the BM emission factor calculated for the second*

[69] References can be found in the section B.6.2

crediting period should be used. This option does not require monitoring the emission factor during the crediting period."

The sample group of power unit ***m*** used to calculate the build margin should be determined as per the following procedure in the tool consistent with the data vintage selected above.

a) The 5 most recent power units, excluding CDM projects ($SET_{5\text{-units}}$) shall be identified and annual electricity generation of "$AEG_{set\text{-}5units}$" shall be determined.

b) The annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total} in MWh) shall be determined. The set of power units, excluding power units registered to CDM project starting with power units that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} ($SET_{\geq 20\%}$) and their annual electricity generation ($AEG_{SET\geq 20\%}$ in MWh)

c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid.
If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin.

In calculations, for every set of 5 power units added to the generation capacity of Turkey, the selected sets have a lower annual electricity generation than $AEG_{SET\geq 20\%}$. Since the date of activation of power units in 2009 are not publicly available and the electricity generations of all combination of 5 units were calculated a smaller value than $AEG_{SET\geq 20\%}$.
Then, $SET_{sample} = SET_{\geq 20\%}$

The selected set of power units ($SET_{\geq 20\%}$) which comprise 20% of AEG_{total} is the capacity addition is selected from year 2006 to 2009 with addition of seven plants from the year 2005. Power plants registered as CDM projects should be excluded from the set.

The lists of the power plants are tabulated under Annex 3, Table 26 - Table 30 of this PDD.

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

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (3)$$

Where,

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

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

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

m = Power units included in the build margin

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

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance in Step 4 (a) for the simple OM, using options A1, A2 or A3, using for *y* the most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.

Option A2 is preferred because plant specific fuel consumption data is not available for Turkey. However, for a power plant m, only data on electricity generation and fuel types used is available. Thus, the emission factor should be determined based on the CO2 emission factor of the fuel type used and the efficiency of power units as follows;

$$EF_{EL,my} = \frac{EF_{CO_2,m,i,y} \times 3.6}{\eta_{m,y}} \quad (4)$$

Where:

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

$EF_{CO2,m,i,y}$ = Average CO_2 emission factor of fuel type I used in power unit m in year y (tCO_2/GJ)

$n_{m,y}$ = Average net energy conversion efficiency of power unit *m* in year *y* (ratio)

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

Table 21: Average net energy conversion efficiency by energy sources (%)[70]

Average Net Energy Conversion Efficiency by Energy Sources (%)						
Sub-Bituminous Coal	Lignite	Fuel-oil	Diesel-oil	LPG	Naphtha	Natural Gas
0.390	0.390	0.395	0.395	0.395	0.395	0.600

Table 22: Average CO_2 emission factor by fuel types (tCO_2/Tj)

EF CO_2 ($t\ CO_2/\ GJ$) [71]						
Sub-Bituminous Coal	Lignite	Fuel-oil	Diesel-oil	LPG	Naphtha	Natural Gas
0.0928	0.0909	0.0755	0.0726	0.0616	0.0693	0.0543

Please note that, the CO_2 emission factor for renewable energy power plants is taken as "0". Hence, $EF_{EL,m,y}$'s are determined as "0" in the Table 24.

Table 23: $EF_{EL,m,y}$ Calculation

Fuel Type	EF CO_2 (tCO_2/Gj)	η Generation Efficiency (%)	$EF_{EL,m,y}$ (tCO_2/MWh)

[70] References can be found at the section B.6.2 of this PDD.

[71] Retrieved from http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.htm, for more detail please look at B.6.2

Sub-Bituminous Coal	0.0928	0.390	**0.8566**
Lignite	0.0909	0.390	**0.8391**
Fuel Oil	0.0755	0.395	**0.6881**
Diesel Oil	0.0726	0.395	**0.6617**
LPG	0.0616	0.395	**0.5614**
Naphtha	0.0693	0.395	**0.6316**
Natural Gas	0.0543	0.600	**0.3258**

The multiplication of emission factor and electricity generation of capacity addition by source is the amount of emission by source which is divided by total capacity addition between year 2005-2009 which comprises 20% of total generation, excluding projects registered to CDM, gives the build margin CO_2 emission factor (see equation 3). Table 24 shows the data applied.

Table 24: BM calculation by capacity addition

Fuel Type	Electricity generation Capacity addition (GWh)	$EF_{EL,m,y}$ (tCO_2/MWh)	Emission by source
Sub-bituminous Coal	3,993.33	0.8566	3,420.748
Lignite	7,023.00	0.8391	5,892.837
Fuel-oil	1,651.49	0.6881	1,136.392
Diesel Oil	21.20	0.6617	14.027
LPG	0.00	0.5614	0.000
Naphtha	578.60	0.6316	365.441
Natural Gas	19,535.96	0.3258	6,364.814
Wind + Geothermal	2,389.71	0	0
Hydro	4,343.15	0	0
Renewable + Waste	220.02	0	0
Total	39,756.45		17,194.26
Excluding VER projects generation[72]	2.106,69		
Total EG m,y	37,649.76		

$$\mathbf{EF_{grid, BM, y}} = 37,649.76/\ 17,194.26 = \mathbf{0.45668971248\ tCO_2/MWh}$$

Step 6: Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor**,** $EF_{grid, CM, y}$, is based on the following methods;

a) Weighted average CM

[72] Please follow the emission reduction Excel sheet to obtain the amount.

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b) Simplified CM

The weighted average CM method is preferred to calculate.

a) Weighted average CM method:
The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM} \quad (5)$$

Where:

$EF_{grid,CM,y}$	= Combined 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)
$EF_{grid,BM,y}$	= Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
W_{OM}	= Weighting of the operating margin emission factor (%)
W_{BM}	= Weighting of the build margin emission factor (%)

"Tool to calculate the emission factor for an electricity system, ver. 02.2.1" states that;
The following default values should be used for $\mathbf{w_{OM}}$ and $\mathbf{w_{BM}}$:

• Wind and solar power generation project activities: $\mathbf{w_{OM}}$ = 0.75 and $\mathbf{w_{BM}}$ = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;

• All other projects: $\mathbf{w_{OM}}$ = 0.5 and $\mathbf{w_{BM}}$ = 0.5 for the first crediting period, and $\mathbf{w_{OM}}$ = 0.25 and $\mathbf{w_{BM}}$ = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

Since the proposed project is HEPP, the weighs for the operating margin and build margin emission factors are 0.50 and 0.50 respectively.

$EF_{grid,CM}$ = (0. 6556512774 *x* 0. 50) + (0.45668971248 *x* 0. 50) = ***0.556601243283*** **tCO_2/ MWh**

Project emissions (PE_y)

Project emission is calculated as per "ACM0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources, ver. 12.1"
For most renewable power generation project activities, PE y = 0. However, some project activities may involve project emissions that can be significant.

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad (6)$$

The formula indicated total project emission where:

PE_y = Project emissions in year y (tCO_2e/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 (tCO_2e/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 hydro power plant.

The project will have some internal electricity consumption and this internal electricity consumption of the power house will be met from the project's own electricity generation. When there is no generation, the electricity need will be provided from generators.

Furthermore, "ACM0002, ver. 12.1" suggests that for hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions 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 due to reservoir are calculated with the formula;

$$PE_{HP,y} = \frac{EF_{Res} \cdot TEG_y}{1000} \quad (7)$$

where:

$PE_{HP, y}$ = Emission from reservoir expressed as tCO_2e/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).

If the power density (PD) of the hydro power plant is above 10 W / m^2, PE y is 0.

The power density of the Project activity is calculated as equation below:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \quad (8)$$

where:

PD = Power density of the project activity, in W/m^2

Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W)

Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero.

A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full. (m^2)

A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m_2). For new reservoirs, this value is zero.

Cap_{PJ} = 6,030,000 W

Cap_{BL} = 0 (Justification: The project is a new hydro power plant)

The area of reservoir within the scope of project is 0 m^2.[73]
A_{PL} = 0 m^2 (area may cause CH_4 emission)
A_{BL} = 0 (Justification: The project is a new hydro power plant)

Therefore;

PD = (6,030,000 – 0) / (0 – 0) = 6,030,000 W/m^2

Since the power density of the project is greater than 10 W/m^2, PE_y is assumed to be 0 as suggested in "ACM0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources, version 12.1."

Leakage

The energy generating equipment is not transferred from or to another activity. Therefore leakage does not have to be taken into account and is taken as 0 tCO_2/year.

Emission Reductions (ER_y)

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (9)$$

where:

ER_y = Emission reductions in year y (t CO_2e/y)

BE_y = Baseline Emissions in year y (t CO_2e/y)

PE_y = Project emissions in year y (t CO_2e/y)

LE_y = Leakage emissions in year y (t CO_2e/y)

Baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the combined margin emission factor, EF_{CM}.

[73] Çay Weir and HEPP, Feasibility Study Report, page (6-37), Table 6.6

Therefore; the **emission reduction** is:

(35 061 MWh/y x 0.556601 t CO_2e/MWh) – 0 – 0 = ***19 515 CO_{2-eq}/y***

Çay Weir and HEPP project will result in a CO_{2-eq} reduction of ***19 515 tons***.

B.6.4 Summary of the ex-ante estimation of emission reductions:

Table 25: Summary of the ex-ante estimation of emission reductions

Year	Estimation of project activity emissions (tonnes CO_2-eq)	Estimation of baseline emissions (tonnes CO_2-eq)	Estimation of leakage (tonnes CO_2-eq)	Estimation of overall emission reductions (tonnes CO_2-eq)
September-December 2014 (4 months)	0	6 505	0	**6 505**
2015	0	19 515	0	**19 515**
2016	0	19 515	0	**19 515**
2017	0	19 515	0	**19 515**
2018	0	19 515	0	**19 515**
2019	0	19 515	0	**19 515**
2020	0	19 515	0	**19 515**
January-August 2021 (8 months)	0	13 013	0	**13 013**
TOTAL	0	136 605	0	**136 605**

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	**EGy, Çay Weir and HEPP**
Data unit:	MWh
Description:	Net Electricity generated and delivered to the grid by the Çay Weir and HEPP project in year "y"
Source of data to be used:	Metering devices used in power plants, monthly records signed by TEIAS and plants manager and invoices will be used.
Value of data	35061 MWh/year
Description of measurement methods and procedures to be applied:	Generation data will be measured by two metering devices continuously. These measurements will be recorded monthly to provide the data for the monthly invoicing to TEIAS. Each month, an officer from TEIAS and the manager/electricity technician of the power plant will record the readings and sign. The continuous measurement of the produced electricity by electricity metering device –ammeter- is to determine the efficiency of power plant. The recordings of TEİAŞ are used to determine the amount of net electricity generated since it is a governmental agency.

QA/QC procedures to be applied:	Two calibrated ammeters will act as backup for each other. Maintenance and calibration of the metering devices will be made by TEIAS periodically. If the difference between the readings of two devices exceeds 0.2%, maintenance will be done before waiting for periodical maintenance.
Any comment:	

Data / Parameter:	**Qmin**
Data unit:	m^3/s
Description:	The minimum flow released to the downstream of creek after regulator structure also known as minimum flow which is ecological water demand of creek and area when diversion to the transmission channel is present. Minimum flow should be at least 10% of the annual average flow rate of Özlüce (Gelevera) Creek and General Directorate of State Hydraulic Works determines and obliges the releasing of minimum flow.
Source of data to be used:	Will be measured via flow meter.
Value of data	
Description of measurement methods and procedures to be applied:	During the operation of HEPP, the flow is measured continuously by a flow meter which is placed after the regulator and in conjunction with DSİ online system. As well, the reports of monthly values of minimum flow will be reported to The Provincial Directorate of Environment and Forestry.
QA/QC procedures to be applied:	The minimum flow is controlled by General Hydraulic State Works The 22nd Regional Directorate and Trabzon Provincial Department of Environment and Forestry.
Any comment:	

Months	**Released after weir (m^3/s)**
January	1.5
February	1.5
March	1.5
April	4
May	4
June	1.5
July	1.5
August	1.5
September	1.5
October	1.5
November	1.5
December	1.5

Data / Parameter:	**Air quality**
Description:	Air quality is determined by the calculated amount of CO_2 emission reductions by the way of proposed project activity.
Source of data	The official data of TUIK (Turkish Statistical Institute) will be chosen.
Description of measurement methods and procedures to be applied:	The emission reduction amount directly gives the effect of project to air quality. Since the proposed project has no emission of GHG, there will be no effect to the air quality negatively. On the other hand, if the proposed project was a conventional power plant, the GHG emissions would be

	released. Hence, the air quality parameter can be monitored by means of emission reduction. The reduced CO_2 emission amount will be monitored to monitor the parameter; air quality. The calculation will be done per crediting period.
QA/QC procedures to be applied:	The data used in the calculation of Emission Factor based on the relevant tool will be taken from official statistics. (referred from TUİK)
Any comment:	

Data / Parameter:	**Employment (Job quality)**
Description:	Trainings are an important issue to improve the job quality of employees.
Source of data:	Training certificates
Description of measurement methods and procedures to be applied:	Respective staff is trained regarding health and safety issues and first aid. There is also technical training regarding the operation of the equipment. The trainees receive a certificate after these trainings. Therefore the training given to the respective staff will be monitored by the certificates that they will obtain following their education. The frequency of monitoring is annually.
QA/QC procedures to be applied:	The trainees receive a certificate after these trainings.
Any comment:	

Data / Parameter:	**Employment (Job quantity)**
Description:	The project activity will create a substantial number of jobs in the project area.
Source of data:	Domicile and social security records or via the web portal of SSK.
Description of measurement methods and procedures to be applied:	The personnel employed will be registered in the Social Security Institution (SSK). The number of the personnel will be monitored by the domicile and Social Security Institution documents. Domicile documents will prove how many people had been employed in the region. Apart from the documents the registration of an employee to the Social Security Institution may be monitored by the web portal of SSK by simply entering the ID number of the respective employee. The frequency of monitoring is annually.
QA/QC procedures to be applied:	All employees in all kinds of sectors shall be registered to SSI portal.
Any comment:	

Data / Parameter:	**Livelihood of the poor**
Description:	Generating electricity from resources that was not used before creates an additional income to the local community, influencing the poverty alleviation, particularly in the rural areas, and accelerates the regional economic development.
Source of data:	Contracts with local people employed or local subcontractors
Description of measurement methods and	The impact on the local economy shall be monitored and reported in form of contracts with and invoices from local subcontractors and businesses. The frequency of monitoring is once for monitoring period.

procedures to be applied:	
QA/QC procedures to be applied:	The contracts will be in consensus with QA/QC procedures.
Any comment:	

Data / Parameter:	**Human and institutional capacity**
Description:	The use of renewable energy in the region will require widespread education and improvement in skills of plant staff, as the local people will be incorporated in the development and maintenance of the project.
Source of data:	The number and evaluation of training certificates
Description of measurement methods and procedures to be applied:	Educations and trainings are part of monitoring. The measurement of improved skills of plant staff by the way of training certificates is the method of measurement. The frequency of monitoring is once for monitoring period.
QA/QC procedures to be applied:	The training certificates will be in consensus with QA/QC procedures.
Any comment:	

Data / Parameter:	**Balance of payments (sustainability)**
Description:	The project and its role in strengthening the sustainable sector of electricity generation in Turkey tend to contribute to mitigation of import dependency. . Electricity generation from hydro power sources is completely independent from any imports and thus does not have any negative effects on the balance of payments.
Source of data:	The avoided natural gas and liquid fuel import amount for electricity production
Description of measurement methods and procedures to be applied:	Through comparing electricity generated by the proposed project and natural gas, liquid fuel amount that would be used to produce the same amount of electricity. The positive effect of this project to this indicator will be monitored by calculation of avoided natural gas and liquid fuel import amount for electricity production. Annual monitoring will be applied.
QA/QC procedures to be applied:	The share of electricity generation from natural gas and liquid petroleum fuels, total natural gas and liquid petroleum fuels amounts used for electricity production and electricity production amount of natural gas and liquid petroleum fuels will be taken from official statistics.
Any comment:	

Data / Parameter:	**Cap_{PJ}**
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data:	Project site

Description of measurement methods and procedures to be applied:	The aggregation of capacities of each turbine which produces electricity. The name plates of turbines will be photographed annually and cross checked with the value of installed capacity designated in the electricity production license.
QA/QC procedures:	-
Any comment:	-

B.7.2 Description of the monitoring plan:

A professional monitoring system is required for the plant to verify the actual emission reduction. Since the emission reductions have to be verified continuously for the whole operation process, a monitoring plan is established.

The generated electricity will already be recorded by both TEIAS monthly and measured by the project owner continuously for billing purposes. Hence no new additional protocol will be needed to monitor the electricity generation. The Plant Manager will be responsible for the electricity generated, gathering all relevant data and keeping the records on daily basis. They will be informed about VER concepts and mechanisms and how to monitor and collect the data which will be used for emission reduction calculations.

The generation data collected during the first crediting period will be submitted to EN-ÇEV Enerji Çevre Yatırımları ve Danışmanlığı Haritacılık İmar İnşaat Ltd. Şti. who will be responsible for calculating the emission reduction subject to verification: Generation data will be used to prepare monitoring reports which will be used to determine the emission reduction from the project activity. These reports will be submitted to the duly authorized and appointed Designated Operational Entity –DOE- before each verification period.

TEIAS is responsible for both installation of the metering devices and data monitoring as per regulations. Two metering devise will be used for monitoring the electricity generated by proposed project; one for the main metering, the second one is used as spare (cross check). In case of discrepancy between the two devices, TEIAS will conduct the necessary calibration works or the maintenance.

In case of a major failure at both metering at the same time, electricity generation by the plant since the last measurement will be able to be monitored by another metering device at the inlet of the main substation operated by TEIAS where the electricity is fed to the grid.

Calibration of the metering devices will be made by TEIAS and sealed during first operation of the plant. Pursuant to "Measurement Equipment Inspection Regulation" of the Ministry of Commerce and Industry, Article 9." [74] periodical inspections of electrical meters and the related current and voltage transformers are controlled every ten years. The meters will be calibrated by TEIAS when there is a significant inconsistency between two devices using a fixed template[75] or

[74] Retrieved from http://www.mevzuat.adalet.gov.tr/html/21179.html
[75] Retrieved from http://www.teias.gov.tr/mali/GDUY/PRO_FORM/OLCUM/DAG02.xls

upon request by either project owner or TEIAS[76]. The manufacturers of the electrical meters do not require any periodical calibration.

In addition to two metering devices, the generated electricity can be cross checked from the website[77] of TEIAS-PMUM (Market Financial Settlement Centre). However it must be noted that PMUM web page will show the net electricity generated; less transmission loss, in order to match the data, the figures taken from PMUM web site must be multiplied by transmission loss factor of the grid. The data which will be the basis of the emission reduction is including transmission loss however excluding internal consumption of power plant.

The net electricity fed to the grid will be measured continuously by metering devices and recorded by TEIAS monthly and form the basis for invoicing using the template formed by TEIAS[78]. The production operator of plant will record the generation data monthly. For consistency, recorded data will be compared with electricity sale receipts. All data collected will be recorded daily and archived both as electronically and as hard copy for at least two year in order to be able to monitor the archived net electricity production. When the power plant starts to generate electricity, the data recording will be started. Every record will be achieved for at least two years after its measurement.

Furthermore to demonstrate the emission reduction, the required data are the amount of electricity generated by the project activity and consumption for the auxiliary diesel generator (IPCC guidelines will be used as data source for calculating the project emissions due to diesel fuel consumption.) since the emission of the diesel generator should be excluded (if any) from the emission reductions, according to the tool.

The institutional arrangement of plant staff during operation of plant is planned to employ 4 people. The proper arrangement of staff tasks and distribution of these tasks result in higher efficiency in all fields and systematic monitoring of plant.

The figure below shows the arrangement and the distributed tasks follow.

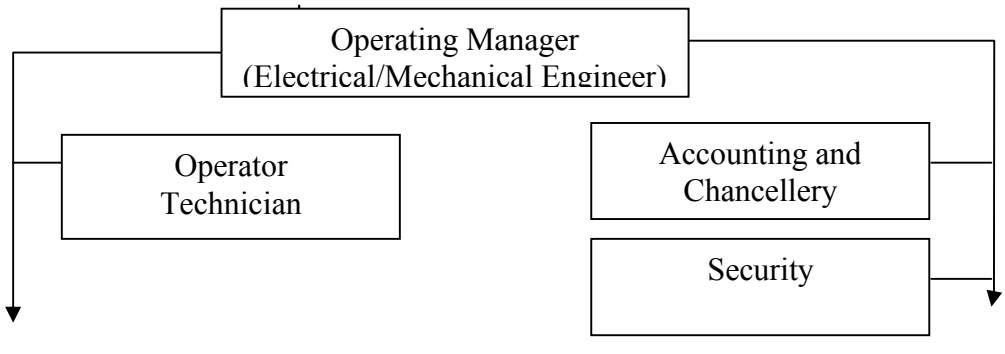

Figure 7: Institutional Arrangement of plant staff during operation

[76] Retrieved from http://www.epdk.gov.tr/english/regulations/electric/balancing/balancing.doc
[77] Please see http://pmum.teias.gov.tr
[78] Retrieved from http://www.teias.gov.tr/mali/GDUY/PRO_FORM/OLCUM/K01.xls

Operating Manager: Overall responsibilities of compliance with VER monitoring plan and operation of plant.

Operator-Technician: Responsible for keeping data to day running of plant, recording, monitoring of relevant data and periodical reporting. Staff will responsible for day to day operation and maintenance of the plant and equipments. All staff will be trained and will have certificate for working with high voltage equipments.

Accounting and Chancellery: Responsible for keeping data about power sales, invoicing and purchasing.

EN-ÇEV (The Consultant): Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

The potential sustainable development benefits of Çay Weir and HEPP will be monitored as per effected indicators of sustainable development matrix. Those indicators are either crucial for an overall positive impact on sustainable development or particularly sensitive to changes in the framework conditions.

The environmental development of monitored by the indicator; air quality. The parameter of air quality is determined by the calculated amount of $CO_{2\text{-}eq}$ emission reductions by the way of proposed project activity.

The economic and technological development is monitored by the way of indicators; balance of payments and job quantity. Parameter of balance of payments is calculation of avoided natural gas import amount for electricity production. Parameter of job quantity is number of personnel from Social Security Institution documents.

The social development is monitored by the way of indicators; human and institutional capacity, livelihood of the poor and job quality. Parameter of human & institutional capacity and job quality is number of acquired certificates of trained personnel (training certificates). Parameter of livelihood of the poor is contracts invoices with or from local people, subcontractors and businesses.

All of these parameters will be monitored annually. Based on the monitoring plan, the data will be gathered and will be reported on the sustainable development attributed to the Project. For detailed information please refer to tables at section B.7.1.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

Date of completing the final draft of this baseline section: 24/03/2012

Name of entity determining the baseline:
EN-ÇEV Enerji Çevre Yatırımları ve Danışmanlığı Haritacılık İmar İnşaat Ltd. Şti.
EN-ÇEV which is the carbon consultant of Çay Weir and HEPP project is not a project participant.

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Address: Mahatma Gandi Caddesi, No: 92/2-3-4-6-7 06680 G.O.P – Ankara/ TURKEY
Tel: +90 312 447 26 22
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Contact Person: Özer Emrah Öztürk
E-mail: emrah@encev.com.tr

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

25/08/2011

C.1.2. Expected operational lifetime of the project activity:

Starting from the date, 16/03/2011, the electricity production license was issued to project owner for 49 years.

The plant will be delivered to the government at the end of operation period gratuitously. The expected operational lifetime of the project is estimated at about ***45 years 7 months 16 days,*** considering that the starting date of operation is 01/08/2014.

As per "Tool to determine the remaining lifetime of the equipment" EB 50, Annex 15, the technical lifetime is defined as the total time for which the equipment is technically designed to operate from its first commissioning. The technical lifetime of electromechanical equipment is accepted as 35 years with respect to the data used in the conducted Feasibility Report of the proposed project.

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

Renewable crediting period is used for the project. The crediting period is expected to be renewed for 2 times, the length of crediting period is 7 years 0 months for each.

C.2.1.1. Starting date of the first crediting period:

01/08/2014

C.2.1.2. Length of the first crediting period:

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7 years, 0 months, 0 days

C.2.2. Fixed crediting period:

Fixed crediting period is not used for the project.

C.2.2.1. Starting date:

-

C.2.2.2. Length:

-

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The project will contribute to improve the environmental situation in the region and in the country. Avoiding fossil fuel-based electricity generation plants will enhance the air quality and help to reduce the adverse affects at the climate. Renewable technologies and hydro power will be introduced and sustainable development will be promoted. The project activity itself will not have any significant negative impacts on humans, plants, animal life and biodiversity which were verified by the conducted "Project Introductory File" and the resultant "EIA Exemption".

In Turkey it is mandatory to assess projects and all construction activities such as power plants, factories, mining projects and large buildings in terms of physicochemical aspects, ecology, socio-economy, socio-culture and public health. Pursuant to project type/ activity/ installed capacity; some of the projects have to conduct an EIA report which shall be submitted to Ministry of Environment and Forestry and some of them have to conduct a Project Introductory File which shall be submitted to Provincial Directorate of Environment and Forestry. The project types are listed at the By-Law on Environmental Impact Assessment (EIA) [79], Annex 1 lists the project that have to submit an EIA Report. The Annex 2 of the by-law lists the projects to be applied "selection-elimination criteria".

The proposed Project is listed under the Annex-2 and Project Introductory File submission is required as per by-law.

As mentioned, this assessment interprets the impacts of the HEPP project to project site and environment in detail. The Project Introductory File was submitted to the Giresun Provincial Directorate of Environment and Forestry in order to be evaluated by the relevant local governmental authorities. After evaluation of the project by the local authorities, it was concluded that the project does not have significant environmental effects and the EIA Exemption letter was obtained on 20/01/2011.

[79] Published in the official gazette (17/07/2008 dated and no. 26939

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D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

The project has been assessed by its environmental and social affects and has been granted Ministry's decision on the environmental acceptability of the project based on the findings of the Environmental Assessment Committee. There have not been identified any significant environmental impacts of the Project.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

According to the Gold Standard Toolkit, the project consultant, EN-ÇEV Enerji Çevre Yatırımları ve Danışmanlığı Haritacılık İmar İnşaat Ltd. Şti. invited local residents, local/national policy makers, and local/national/international NGOs via mail and follow-up calls.

An invitation letter and non-technical project summary were sent out in Turkish fax/mail to the stakeholders mentioned above. Furthermore, an announcement was published in Turkish in the /regional newspaper "Yeşilgiresun" on 27/08/2011.

The English version of announcement is as follows:

We have the pleasure of inviting you to participate in the Public Stakeholder Consultation Meeting of the Çay Weir and Hydroelectric Power Plant Project that is planned to be constructed in Province of Giresun, Espiye District. The aim the of the meeting is to obtain feedback and provide information about the project and its significance in Gold Standard Organization Platform due to leading reduction in carbon emissions. Your participation will be a pleasure for us.

Location: Espiye District, Kaleboynu Neighbouring, Kızıldere Site, Kaleboynu Primary School
Date: 05.10.2011
Time: 14.00
Consultant: EN-ÇEV Enerji Çevre Yatırımları ve Danışmanlığı Haritacılık İmar İnaşaat Ltd. Şti.
Address: Mahatma Gandi Cad. No: 92/2 GOP/ANKARA
Tel: 0 312 447 26 22 Fax: 0 312 446 38 10
www.encev.com.tr
Investor: Martı Elektrik Üretim A.Ş.

The Local Stakeholder Consultation meeting was realized on 5/10/2011 with the attendance of 22 local residents, 2 experts from Giresun Provincial Directorate of Environment and Forestry. Please see the LSC Report of proposed project for details and photos. Supporters of Gold Standard Organizations i.e WWF, Greenpeace and REC Turkey have been informed about the project, however they did not attend.

Prior to blind sustainable development exercise, questions and comments were taken from participants about further clarification of project. Questions and comments raised by participants were addressed in assessment of comments part.

In brief, the meeting was ended after the project was explained and discussed with the participants. The support of the participant for the project was easily observed.

E.2. Summary of the comments received:

The briefing was found affirmative and informative.

The certain employment opportunities and possible economical development of the distinct are seen positive to stakeholders. On the other hand, they were worried about the possible destruction during construction activities and whether not releasing the ecological water after the weir structure. Any chemical discharge to creek owing to the proposed project was another concern.

The questions which was asked and answered during LSC were stated below.

Questions:

1. Would any foreign substances and chemicals (metal, cyanide) mix into the brook?
   (Ahmet Kop – Village of Bahçeli)
   Answer: There would be no mixture of chemicals into the brook. The operating principle of the HEPP's involves transmission of the brook water to the power plant area and generation of electricity by processing such water at the turbines. There would be no mixtures during processing by turbines. Water would be released into the brook from the power plant in the exact quality and volume at the time of intake.

2. Would the water level of the brook reduce?
   (Bilal Küp – Village of Bahçecik)
   Answer: There would be a certain decline in the flow rate in the section from the weir to the location of the power plant. The volume of minimum flow as considered appropriate by DSİ for maintenance of ecological life will be released into this section of the brook bed. After the location of the power plant, any water volumes used will be re-supplied into the brook bed without any change in the entire water content.

In the referred meeting; five important issues for stakeholders are stated below.

- It is observed that all people support the project. But care for minimum environmental destruction during construction works is desired.
- Request is made to choose the staff to be employed in the plant from among the local people as much as possible.
- All attendance agrees upon the opinion that these type of projects should be supported since they don't cause carbon emission and thus, global heating.
- Local people believe that the region shall develop socially and economically with the mentioned project.
- For the blind SD matrix, survey sheets were distributed to the stakeholders and done by the help of our consultant.

E.3. Report on how due account was taken of any comments received:

No major concerns were raised during the entire initial stakeholder consultation process. During the consultation, the concerns of stakeholders (unemployment, waste, pollution and noise) have been taken into consideration all the way. The defined minimum water flow shall always be released continuously into the river basin, without using it, as required by DSI (State Hydraulic Works) by regulations. The employees were primarily chosen from the region. The company's construction works are under the legal limits and no complaints have been received. Moreover, the company has been following the regulations for waste management. All necessary actions will be taken in due course to compensate any damages owing to construction of weir and HEPP. (Please see more details in LSC Report provided to GS)

The stakeholders have not important suggestions and negative opinion regarding the project, which may necessitate revisiting sustainability assessment. Therefore sustainable assessment is not going to be revisited as well as no alteration in project design will be done.

ANNEX 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Usta Grup-Martı Enerji Üretim A.Ş
Street/P.O.Box:	Söğütözü Mah. Yaşam Cad. Ak Plaza 8. Kat
Building:	No 7 / 26-27
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State/Region:	
Postfix/ZIP:	
Country:	Turkey
Telephone:	(312) 219 00 61
FAX:	
E-Mail:	info@usragroup.com
URL:	
Represented by:	Özkan Alioğlu
Title:	Company Coordinator
Salutation:	
Last Name:	Alioğlu
Middle Name:	-
First Name:	Özkan
Department:	
Mobile:	
Direct FAX:	(312) 219 00 60
Direct tel:	(312) 219 00 61
Personal E-Mail:	ozkanalioglu@ustagrup.com

Annex 2

ODA DECLARATION

Please find the Official Development Assistance Declaration template below. This document should be signed, scanned and submitted as an Annex to your Gold Standard Passport.

Letterhead of Project Owner
Date
Project reference Çay HEPP (11,210 MW) Giresun
To: Gold Standard Foundation

Declaration of Non-Use of Official Development Assistance by Project Owner

[Project Owner] Marti Enerji Üretim A.Ş
As Project Owner of the above-referenced project, acting on behalf of all project participants, I now make the following representations

[Authorised Representative] İbrahim USTA
I hereby declare that I am duly and fully authorised by the project owner of the above-referenced project, acting on behalf of all project participants, to make the following representations on Project Proponent's behalf:

I. Gold Standard Documentation
I am familiar with the provisions of Gold Standard Documentation relevant to Official Development Assistance (ODA). I understand that the above-referenced project is not eligible for Gold Standard registration if the project receives or benefits from Official Development Assistance under the condition that some or all credits coming out of the project are transferred to the ODA donor country. I now expressly declare that no financing provided in connection with the above-referenced project has come from or will come from ODA that has been or will be provided under the condition, whether express or implied, that any or all of the credits [CERs, ERUs or VERs] issued as a result of the project's operation will be transferred directly or indirectly to the country of origin of the ODA.

II. Duty to Notify Upon Discovery.
If I learn or if I am given any reason to believe at any stage of project design or implementation that ODA has been used to support the development or implementation of the project, or that an entity providing ODA to the host country may at some point in the future benefit directly or indirectly from the credits generated from the project as a condition of investment, I will make this known to the Gold Standard immediately.

III. Sanctions. I am fully aware that under Section 10 of the Gold Standard Terms and Conditions sanctions and damages may be incurred for the provision of false information related to Projects and/or Gold Standard credits.

Signed:
Name: Özkan Akoğlu
Title: Civil Engineer - Company Coordinator
On behalf of: İbrahim USTA

Developed by Ecofys, TÜV-SÜD and FIELD

Annex 3

BASELINE INFORMATION

Table 26: Generation units put into operation in 2009

POWER PLANTS	INSTALLED CAPACITY (MW)	PRODUCTION (GWh)	FUEL TYPE
ITC-KA ENERJİ (SİNCAN)	2,8	22	Waste
ITC-KA ENERJİ MAMAK KATI ATIK TOP.MERK.	2,8	21,062	Waste
ORTADOĞU ENERJİ (KÖMÜRCÜODA)	5,8	45	Waste
ORTADOĞU ENERJİ (ODA YERİ) (İlave)	4,2	77,953	Waste
ORTADOĞU ENERJİ (ODA YERİ) (İlave)	5,7		
ALKİM ALKALİ KİMYA (Cihanbeyli/KONYA)	0,4	3	Lignite
SİLOPİ ELEKTRİK ÜRETİM A.Ş.	135	945	Asfaltit
İÇDAŞ ÇELİK (İlave)	135	1923,33	Imported coal
İÇDAŞ ÇELİK (İlave)	135		
GÜRMAT ELEKT. (GÜRMAT JEOTERMAL)	47,4	313	Geothermal
CARGILL TARIM VE GIDA SAN. TİC. A.Ş.	0,1	0,7	Biogas
KASAR DUAL TEKSTİL SAN. A.Ş. (Çorlu)	5,7	38	N.gas
KEN KİPAŞ ELKT. ÜR.(KAREN) (K.Maraş)	17,5	75,36	N.gas
MARMARA PAMUKLU MENS. SN.TİC.A.Ş.	34,9	271,53	N.gas
MAURİ MAYA SAN. A.Ş.	0,3	19	N.gas
MAURİ MAYA SAN. A.Ş.	2		
TAV İSTANBUL TERMİNAL İŞLETME. A.Ş.	3,3	82	N.gas
TAV İSTANBUL TERMİNAL İŞLETME. A.Ş.	6,5		
TESKO KİPA KİTLE PAZ. TİC. VE GIDA A.Ş.	2,3	18	N.gas
SÖNMEZ ELEKTRİK(Uşak) (İlave)	8,7	67,057	N.gas
RASA ENERJİ (VAN)	78,6	500	N.gas
SELKASAN KAĞIT PAKETLEME MALZ. İM.	9,9	73	N.gas
ZORLU ENERJİ (B.Karıştıran) (İlave)	49,5	394,96	N.gas
NUH ÇİMENTO SAN. TİC. A.Ş.(Nuh Çim.) (İlave)	47	329	N.gas
ENTEK KÖSEKÖY(İztek) (Düzeltme)	0,8	98,68	N.gas
ENTEK KÖSEKÖY(İztek) (Düzeltme)	36,3		
FALEZ ELEKTRİK ÜRETİMİ A.Ş.	11,7	88	N.gas
GLOBAL ENERJİ (PELİTLİK)	8,6	65,66	N.gas
GÜL ENERJİ ELKT. ÜRET. SN. VE TİC. A.Ş.	24,3	170	N.gas
AK GIDA SAN. VE TİC. A.Ş. (Pamukova)	7,5	61	N.gas
AKSA AKRİLİK KİMYA SN. A.Ş. (YALOVA)	70	539	N.gas
AKSA ENERJİ (Antalya) (Güç Değişikliği)	16,2	4744,74	N.gas
AKSA ENERJİ (Antalya) (İlave)	300		
AKSA ENERJİ (Antalya) (İlave)	300		

AKSA ENERJİ (MANİSA) (İlave)	10,5	498,072	N.gas
AKSA ENERJİ (MANİSA) (İlave)	52,4		
ÇELİKLER TAAH. İNŞ. (RİXOX GRAND)	2	16	N.gas
DALSAN ALÇI SAN. VE TİC. A.Ş.	1,2	9	N.gas
CAM İŞ ELEKTRİK (Mersin) (İlave)	126,1	1008	N.gas
ANTALYA ENERJİ (İlave)	41,8	302,096	N.gas
ARENKO ELEKTRİK ÜRETİM A.Ş. (Denizli)	12	84	N.gas
DELTA ENERJİ ÜRETİM VE TİC.A.Ş.	47	467	N.gas
DELTA ENERJİ ÜRETİM VE TİC.A.Ş. (İlave)	13		
DESA ENERJİ ELEKTRİK ÜRETİM A.Ş.	9,8	70	N.gas
ERDEMİR(Ereğli-Zonguldak)	39,2	221,02	Fuel oil
SİLOPİ ELEKTRİK ÜRETİM A.Ş.(ESENBOĞA)	44,8	315	Fuel oil
TÜPRAŞ RAFİNERİ(Aliağa/İzmir)	24,7	171,77	Fuel oil
TÜPRAŞ O.A.RAFİNERİ(Kırıkkale)(Düzeltme)	10	70	Fuel oil
AK ENERJİ (AYYILDIZ RES)	15	51	Wind
ALİZE ENERJİ (ÇAMSEKİ RES)	20,8	82	Wind
ALİZE ENERJİ (KELTEPE RES)	18,9	65	Wind
ALİZE ENERJİ (SARIKAYA RES) (Şarköy)	28,8	96	Wind
AYEN ENERJİ A.Ş. AKBÜK RÜZGAR	16,8	123	Wind
AYEN ENERJİ A.Ş. AKBÜK RÜZGAR (İlave)	14,7		
BAKİ ELEKTRİK ŞAMLI RÜZGAR	36	337,33	Wind
BAKİ ELEKTRİK ŞAMLI RÜZGAR	33		
BELEN ELEKTRİK BELEN RÜZGAR-HATAY	15	95	Wind
BELEN ELEKTRİK BELEN RÜZGAR-HATAY	15		
BORASKO ENERJİ (BANDIRMA RES)	21	179	Wind
BORASKO ENERJİ (BANDIRMA RES)	24		
DATÇA RES (Datça)	0,8	61,0135	Wind
DATÇA RES (Datça)	8,9		
DATÇA RES (Datça) (İlave)	11,8		
KORES KOCADAĞ RES (Urla/İZMİR)	15	56	Wind
MAZI-3 RES ELEKT.ÜR. A.Ş. (MAZI-3 RES)	10	79	Wind
MAZI-3 RES ELEKT.ÜR. A.Ş. (MAZI-3 RES)	12,5		
ROTOR ELEKTRİK (OSMANİYE RES)	17,5	218	Wind
ROTOR ELEKTRİK (OSMANİYE RES)	17,5		
ROTOR ELEKTRİK (OSMANİYE RES)	22,5		
SAYALAR RÜZGAR (Doğal Enerji)	3,6	11,368	Wind
SOMA ENERJİ ÜRETİM (SOMA RES)	18	150	Wind
SOMA ENERJİ ÜRETİM (SOMA RES)(İlave)	10,8		

SOMA ENERJİ ÜRETİM (SOMA RES)(İlave)	16,2		
ÜTOPYA ELEKTRİK (DÜZOVA RES)	15	46	Wind
YAPISAN (KARICA REG. ve DARICA I HES)	48,5	328	Hydro
YAPISAN (KARICA REG. ve DARICA I HES)	48,5		
YEŞİLBAŞ ENERJİ (YEŞİLBAŞ HES)	14	56	Hydro
YPM GÖLOVA HES (Suşehri/SİVAS)	1,1	3	Hydro
YPM SEVİNDİK HES (Suşehri/SİVAS)	5,7	36	Hydro
TOCAK I HES (YURT ENERJİ ÜRETİM SN.)	4,8	13	Hydro
TÜM ENERJİ (PINAR REG. VE HES)	30,1	138	Hydro
UZUNÇAYIR HES (Tunceli)	27,3	105	Hydro
ANADOLU ELEKTRİK (ÇAKIRLAR HES)	16,2	60	Hydro
BAĞIŞLI REG. VE HES (CEYKAR ELEKT.)	9,9	99	Hydro
BAĞIŞLI REG. VE HES (CEYKAR ELEKT.)	19,7		
BEREKET ENERJİ (KOYULHİSAR HES)	42	329	Hydro
BEYOBASI EN. ÜR. A.Ş. (SIRMA HES)	5,9	23	Hydro
AKUA ENERJİ (KAYALIK REG. VE HES)	5,8	39	Hydro
AKÇAY HES ELEKTRİK ÜR. (AKÇAY HES)	28,8	95	Hydro
CİNDERE HES (Denizli)	19,1		Hydro
DENİZLİ ELEKTRİK (EGE I HES)	0,9	4	Hydro
ELESTAŞ ELEKTRİK (YAYLABEL HES)	5,1	20	Hydro
ELESTAŞ ELEKTRİK (YAZI HES)	1,1	6	Hydro
DEĞİRMENÜSTÜ EN. (KAHRAMANMARAŞ)	12,9	35,425	Hydro
FİLYOS ENERJİ (YALNIZCA REG. VE HES)	14,4	67	Hydro
ERVA ENERJİ (KABACA REG. VE HES)	4,2	33	Hydro
ERVA ENERJİ (KABACA REG. VE HES)	4,2		
KAYEN ALFA ENERJİ (KALETEPE HES)	10,2	37	Hydro
LAMAS III - IV HES (TGT ENERJİ ÜRETİM)	35,7	150	Hydro
OBRUK HES	212,4	473	Hydro
ÖZGÜR ELEKTRİK (AZMAK II REG.VE HES)	24,4	91	Hydro
ÖZTAY ENERJİ (GÜNAYŞE REG.VE HES)	8,3	29	Hydro
ÖZYAKUT ELEK. ÜR.A.Ş. (GÜNEŞLİ HES)	0,6	8	Hydro
ÖZYAKUT ELEK. ÜR.A.Ş. (GÜNEŞLİ HES)	1,2		
ŞİRİKÇİOĞLU EL.(KOZAK BENDİ VE HES)	4,4	15	Hydro
TAŞOVA YENİDEREKÖY HES (HAMEKA A.Ş.)	2	10	Hydro
TEKTUĞ (Erkenek)	6	50	Hydro
TEKTUĞ (Erkenek) (İlave)	6,5		
SARITEPE HES (GENEL DİNAMİK SİS.EL.)	2,5	20	Hydro
SARITEPE HES (GENEL DİNAMİK SİS.EL.)	2,5		

Table 27: Generation units put into operation in 2008

POWER PLANTS	INSTALLED CAPACITY (MW)	PRODUCTION (GWh)	FUEL TYPE
AKSA ENERJİ (Antalya)	183,8	133,7	N.gas
AKSA ENERJİ (Manisa)	52,4	79,2	N.gas
ANTALYA ENERJİ (İlave)	17,5	256,1	N.gas
ATAÇ İNŞAAT SAN. A.S.B.(ANTALYA)	5,4	10,0	N.gas
CAN ENERJİ (Çorlu-TEKİRDAĞ) (İlave)	52,4	274,3	N.gas
ITC-KA Enerji Üretim A.Ş.(Mamak)(İlave)	14,1	95,8	N.gas
KARKEY(SİLOPİ-5) (154 kV) (İlave)	14,8	16,4	Fuel oil
MİSİS APRE TEKSTİL BOYA EN. SAN.	2,0	5,3	N.gas
MODERN ENERJİ (LÜLEBURGAZ)	13,4	508,9	N.gas
POLAT TURZ. (POLAT RENAISSANCE İST.OT.)	1,6	490,0	N.gas
SARAYKÖY JEOTERMAL (Denizli)	6,9	14,1	Geothermal
YILDIZ SUNTA (Uzunçiftlik-Köseköy)(Düzeltme)	22,6	136,0	N.gas
SÖNMEZ Elektrik (İlave)	8,7	61,0	N.gas
AKKÖY ENERJİ (AKKÖY I HES)	101,9	21,6	Hydro
ALP ELEKTRİK (TINAZTEPE) ANTALYA	7,7	9,2	Hydro
CANSU ELEKTRİK (Murgul/ARTVİN)	9,2	12,5	Hydro
ÇALDERE ELK.(ÇALDERE HES)Dalaman-MUĞLA	8,7	11,2	Hydro
DAREN HES ELKT. (SEYRANTEPE BARAJI VE HES)	49,7	14,4	Hydro
GÖZEDE HES (TEMSA ELEKTRİK) BURSA	2,4	6,1	Hydro
H.G.M. ENERJİ (KEKLİCEK HES) (Yeşilyurt)	8,7	120,0	Hydro
HAMZALI HES (TURKON MNG ELEKTRİK)	16,7	2,9	Hydro
HİDRO KNT.(YUKARI MANAHOZ REG.VE HES)	22,4	13,8	Hydro
İÇ-EN ELK.(ÇALKIŞLA REGÜLAT. VE HES)	7,7	3,4	Hydro
KALEN ENERJİ (KALEN II REGÜLAT. VE HES)	15,7	10,3	Hydro
SARMAŞIK I HES (FETAŞ FETHİYE ENERJİ)	21,0	1,5	Hydro
SARMAŞIK II HES (FETAŞ FETHİYE ENERJİ)	21,6	1,2	Hydro
TORUL	105,6	18,6	Hydro
ZORLU ENERJİ (MERCAN) (Düzeltme)	1,275	22,828	Hydro
BAKİ ELEKTRİK ŞAMLI RÜZGAR	21,000	60,943	Wind
DATÇA RES (Datça)	8,100	3,778	Wind
ERTÜRK ELEKTRİK Çatalca RES	60,000	65,961	Wind
İNNORES ELK YUNTDAĞ RÜZG. (Aliağa)	42,500	98,058	Wind
LODOS RES (Taşoluk)(GOP/İSTANBUL)	24,000	25,714	Wind
SAYALAR RÜZGAR (Doğal Enerji)	30,600	53,925	Wind
SEBENOBA (DENİZ ELK.) (Samandağ-HATAY)	31,200	46,919	Wind
TOTAL	**1062,512**	**2025,279**	

Table 28: Generation units put into operation in 2007

POWER PLANTS	INSTALLED CAPACITY (MW)	PRODUCTION (GWh)	FUEL TYPE

MOBİL TOPLAM	-462,3		
HABAŞ (Aliağa-ilave)	9,1	72,8	N.gas
BOSEN	-123,5		N.gas
MODERN ENERJİ	5,2	38,7	N.gas
ARENKO	0,7	5,6	N.gas
ALTINMARKA GIDA	0,1	0,8	N.gas
TEKBOY ENERJİ	0,1	0,7	N.gas
VELSAN AKRİLİK	0,1	0,7	N.gas
AKBAŞLAR	-0,1		N.gas
ORS RULMAN	-0,3		N.gas
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Kadıköy Hast.)(İstanbul/Kadıköy)	0,5	4,0	N.gas
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Kozyatağı Hast.)(İstanbul/Kadıköy)	0,6	5,0	N.gas
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Nilüfer/BURSA)	1,3	11,0	N.gas
AKATEKS Tekstil Sanayi ve Ticaret A.Ş.	1,8	14,0	N.gas
FLOKSER TEKSTİL SAN.AŞ.(Çatalça/istanbul)(Poliser Tesisi)	2,1	17,0	N.gas
FLOKSER TEKSTİL SAN.AŞ.(Çatalça/istanbul)(Süetser Tesisi)	2,1	17,0	N.gas
FRİTOLAY GIDA SAN.VE TİC. AŞ.	0,5	4,0	N.gas
KIVANÇ TEKSTİL SAN.ve TİC.A.Ş.	3,9	33,0	N.gas
KİL-SAN KİL SAN.VE TİC. A.Ş	3,2	25,0	N.gas
SÜPERBOY BOYA SAN.ve Tic.Ltd.Şti.(Büyükçekmece/İstanbul) 05.12.2003	1	8,0	N.gas
SWİSS OTEL(Anadolu Japan Turizm A.Ş (İstanbul)	1,6	11,0	N.gas
TAV Esenboğa Yat. Yapım ve İşletmeAŞ./ANKARA	3,9	33,0	N.gas
STARWOOD	-17,3		N.gas
NUH ENERJİ-2 (Nuh Çim.)	73	514,0	N.gas
KAREN	-24,3		Fuel-oil
AKTEKS	0,8	5,4	Fuel-oil
TÜPRAŞ İZMİT RAFİNERİ	-0,9		Fuel-oil
AKBAŞLAR	-3,8		Fuel-oil
UŞAK ŞEKER (NURİ ŞEKER)	1,7	3,1	Lignite
BOR ŞEKER	-0,6		Lignite
SUSURLUK ŞEKER	-0,6		Lignite
AFYON ŞEKER	-0,8	2,0	Diesel
AĞRI ŞEKER	-1		Diesel
ALPULLU ŞEKER	-0,9	2,3	Diesel
BURDUR ŞEKER	-0,8	2,0	Diesel
ÇARŞAMBA ŞEKER	-0,8	2,0	Diesel
ÇORUM ŞEKER	-0,8	2,0	Diesel
ELAZIĞ ŞEKER	-0,5	1,3	Diesel
ELBİSTAN ŞEKER	-0,8	2,0	Diesel
ERCİŞ ŞEKER	-0,8	2,0	Diesel
EREĞLİ ŞEKER	-0,8	2,0	Diesel
KASTAMONU ŞEKER	-0,2	0,5	Diesel
KÜTAHYA ŞEKER (BAHA ESAD TEKAND)	-0,7	1,8	Diesel
MALATYA ŞEKER	-0,5	1,3	Diesel

BOĞAZLIYAN ŞEKER	16,4	43,1	N.gas
KARTONSAN	5	40,0	N.gas
ESKİŞEHİR END.ENERJİ	3,5	26,8	N.gas
ESKİŞEHİR ŞEKER (KAZIM TAŞKENT)	2,9	7,6	N.gas
İGSAŞ	2,2	15,2	N.gas
DESA	0,7	1,8	N.gas
DENTAŞ	0,3	0,8	N.gas
SÜPER FİLMCİLİK	0,1	0,3	N.gas
ATAER ENERJİ	0,1	0,3	N.gas
BİL ENERJİ	0,1	0,7	N.gas
EDİP İPLİK	-0,1	0,8	N.gas
EGE BİRLEŞİK ENERJİ	-0,3	0,8	N.gas
İSKO	-1,8		N.gas
ITC-KA Enerji Üretim Aş.(Mamak)(İlave)	1,4	11,1	Landfill gas
BİS Enerji Üretim AŞ.(Bursa)(İlave)	43	354,8	N.gas
Aliağa Çakmaktepe Enerji A.Ş.(Aliağa/İZMİR)	34,8	278,0	N.gas
BİS Enerji Üretim AŞ.(Bursa)(Düzeltilme))	28,3	233,5	N.gas
BİS Enerji Üretim AŞ.(Bursa)(İlave)	48	396,1	N.gas
BOSEN ENERJİ ELEKTRİK AŞ.	142,8	1071,0	N.gas
Mamara Elektrik Üretim A.Ş.	-8,7		N.gas
NUH ENERJİ-2(Nuh Çim.)	-73		N.gas
SAYENERJİ ELEKTRİK ÜRETİM AŞ. (Kayseri/OSB)	5,9	47,0	N.gas
T ENERJİ ÜRETİM AŞ.(İSTANBUL)	1,6	13,0	N.gas
ZORLU EN.Kayseri (İlave 1 GT)	7,2	55,0	N.gas
SİİRT	25,6	190,0	Fuel-oil
Mardin Kızıltepe	34,1	250,0	Fuel-oil
KAREN	24,3	180,0	Fuel-oil
İDİL 2 (PS3 A- 2)	24,4	180,0	Fuel-oil
İSKUR TEKSTİL (SÜLEYMANLI HES)	-4,6		Hydro
BORÇKA HES	300,6	1039,0	Hydro
TEKTUĞ(Keban Deresi)	5	32,0	Hydro
YPM Ener.Yat.AŞ.(Altıntepe Hidro.)(Sivas/Suşehir)	4	18,0	Hydro
YPM Ener.Yat.AŞ.(Beypınar Hidro.)(Sivas/Suşehir)	3,6	18,0	Hydro
YPM Ener.Yat.AŞ.(Konak Hidro.)(Sivas/Suşehir)	4	19,0	Hydro
KURTEKS Tekstil A.Ş./Kahramanmaraş(KARASU HES-Andırın)	2,4	19,0	Hydro
İSKUR TEKSTİL (SÜLEYMANLI HES)	4,6	18,0	Hydro
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)	6,3	27,0	Hydro
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)(İlave)	6,3	27,0	Hydro
ANEMON EN.ELEK.ÜRETİM.AŞ.	8		Wind
ANEMON EN.ELEK.ÜRETİM.AŞ.(İlave)	15,2		Wind
ANEMON EN.ELEK.ÜRETİM.AŞ.(İlave)	7,2		Wind

BURGAZ RES (Doğal Enerji Üretim A.Ş.)	4		Wind
BURGAZ RES (Doğal Enerji Üretim A.Ş.)	10,9		Wind
DENİZ ELEK. ÜRETİM Ltd.Şti.(karakurt)	10,8		Wind
MARE MANASTIR RÜZGAR ENERJİ(ilave)	11,2		Wind
MARE MANASTIR RÜZGAR ENERJİ(ilave)	20		Wind
TOTAL	**258,5**	**5459,7**	

Table 29: Generation units put into operation in 2006

POWER PLANTS	INSTALLED CAPACITY (MW)	PRODUCTION (GWh)	FUEL TYPE
EKOTEN TEKSTİL GR-I	1,93	14,2	N.gas
ERAK GİYİM GR-I	1,37	9,8	N.gas
ALARKO ALTEK GR-III	21,89	158,3	N.gas
AYDIN ÖRME GR-I	7,52	60,2	N.gas
NUH ENERJİ-2 GR II	26,08	180,1	N.gas
MARMARA ELEKTRİK (Çorlu) GR I	8,73	63,0	N.gas
MARMARA PAMUK (Çorlu) GR I	8,73	63,2	N.gas
ENTEK (Köseköy) GR IV	47,62	378,2	N.gas
ELSE TEKSTİL (Çorlu) GR I - II	3,16	24,7	N.gas
BARES IX GRUP	13,50		Wind
SÖNMEZ ELEKTRİK (Çorlu) GR I - II	17,46	125,7	N.gas
DENİZLİ ÇİMENTO(DÜZELTME)	0,45		N.gas
MENDERES ELEKTRİK GR I	7,95	55,7	Geothermal
KASTAMONU ENTEGRE (Balıkesir) GR I	7,52	54,1	N.gas
ÇIRAĞAN SARAYI(Bakanlık çıkardı)	-1,36		N.gas
BARES X. ve XX. GRUPLAR	16,50		Wind
BOZ ENERJİ GR I 8,730	8,73	70,2	N.gas
ADANA ATIK SU ARITMA TESİSİ	0,80	6,0	Biogas
AMYLUM NİŞASTA (ADANA)	-6,20		Fuel-oil
AMYLUM NİŞASTA (ADANA)	14,25	33,9	N.gas
ŞIK MAKAS (Çorlu) GR I	1,58	12,8	N.gas
ELBİSTAN B GR III	360,00	2340,0	Lignite
ANTALYA ENERJİ GR I - II - III - IV	34,92	245,1	N.gas
HAYAT TEM. VE SAĞLIK GR I - II	15,04	108,3	N.gas
EKOLOJİK EN. (Kemerburgaz) GR I	0,98	5,9	Landfill gas
EROĞLU GİYİM (Çorlu) GR I	1,17	8,7	N.gas
CAM İŞ ELEKTRİK (Mersin) GR I	126,10	1008,0	N.gas
ELBİSTAN B GR II	360,00	2340,0	Lignite
YILDIZ ENT. AĞAÇ (Kocaeli) GR I	6,18	39,9	N.gas
ÇERKEZKÖY ENERJİ GR I	49,16	389,7	N.gas
ENTEK (Köseköy) GR V	37,00	293,9	N.gas

ITC-KA EN. MAMAK TOP.M. GR I-II-III	4,24	30,3	Landfill gas
ELBİSTAN B GR IV	360,00	2340,0	Lignite
MARE MANASTIR RÜZGAR (X GRUP)	8,00		Wind
ÇIRAĞAN SARAYI GR I	1,32	11,0	N.gas
ERTÜRK ELEKTRİK Tepe RES GR I	0,85	1,9	Wind
AKMAYA (Lüleburgaz) GR I	6,91	50,1	N.gas
BURGAZ (Lüleburgaz) GR I	6,91	54,1	N.gas
VAN-2 -24,700	-24,70		Fuel-oil
KARACAÖREN-II	-0,80		Hydro
SEYHAN I-II	0,30	1,7	Hydro
ŞANLIURFA GR I-II	51,80	124,0	Hydro
BEREKET ENERJİ GÖKYAR HES 3 Grup	11,62	43,4	Hydro
MOLU EN. Zamantı Bahçelik GR I - II	4,22	16,4	Hydro
SU ENERJİ (Balıkesir) GR I - II	4,60	20,7	Hydro
BEREKET EN.(Mentaş Reg) GR I - II	26,60	108,7	Hydro
EKİN (Başaran Hes) (Nazilli)	0,60	4,5	Hydro
ERE(Sugözü rg. Kızıldüz hes) GR I - II	15,43	31,7	Hydro
ERE(AKSU REG.ve ŞAHMALLAR HES) GR I-II	14,00	26,7	Hydro
TEKTUĞ(Kalealtı) GR I - II	15,00	52,0	Hydro
BEREKET EN.(Mentaş Reg) GR III	13,30	54,4	Hydro
TOTAL	**1720**	**11061,2**	

Table 30: Generation units put into operation in 2005

POWER PLANTS	INSTALLED CAPACITY (MW)	PRODUCTION (GWh)	FUEL TYPE	Start Date to Operation
ÇAN GR I	160,00	1040,0	Lignite	
ÇAN GR II	160,00	1040,0	Lignite	
ELBİSTAN-B GR I	360,00	2340,0	Lignite	
AKBAŞLAR GR-II(İZOLE)	8,83		N.gas	
AKÇA ENERJİ GR-III	8,73	65,4	N.gas+naphtha	14.12.2005
AYKA TEKSTİL GR-I	5,50	40,0	N.gas	
BAYDEMİRLER GR IV-V-VI	6,21	51,4	N.gas	
BOSEN GR-III	50,00	350,0	N.gas	3.12.2005
BOSEN (DÜZELTME)	-6,50		N.gas	
ÇUMRA ŞEKER	16,00	40,0	N.gas+lignite	
ETİ MAD.(BAN.ASİT)(SÖKÜLDÜ)	-3,80		Renew.+wastes	
ETİ MAD.(BAN.ASİT)GR-I	11,50	85,0	Renew.+wastes	
EVYAP GR I-II	5,12	30,0	N.gas	
GRANİSER GRANİT GR-I	5,50	42,0	N.gas	
HABAŞ ALİAĞA GR III	47,69	381,6	N.gas	

HABAŞ ALİAĞA GR IV	47,69	381,6	N.gas	
HABAŞ ALİAĞA GR-V	24,60	196,8	N.gas	
HABAŞ ALİAĞA (DÜZELTME)	6,16		N.gas	
HAYAT KAĞIT GR-I	7,53	56,0	N.gas	
İÇDAŞ ÇELİK GR-I	135,00	1080,0	Imported coal	30.11.2005
KAHRAMANMARAŞ KAĞIT GR-I	6,00	45,0	Imported coal	8.12.2005
KORUMA KLOR GR I-II-III	9,60	77,0	N.gas	3.12.2005
KÜÇÜKÇALIK TEKSTİL GR I-II-III-IV	8,00	64,0	N.gas	
MERCEDES BENZ TURK GR I-II-III-IV	8,28	68,0	N.gas	
MODERN ENERJİ GR-III	8,38	62,9	N.gas	
MODERN ENERJİ (DÜZELTME)	-10,00		N.gas	
MODERN ENERJİ GR-II	6,72	50,4	N.gas+lpg	
MOSB GR I-II-III(SÖKÜLDÜ)	-54,30		F.oil	
MOSB GR I-II-III-IV-V-VI-VII	84,83	434,0	N.gas	
ORS RULMAN	12,42	99,4	N.gas	
PAK GIDA(Kemalpaşa) GR-I	5,67	45,0	N.gas	7.12.2005
TEZCAN GALVANİZ GR I-II	3,66	29,0	N.gas	
YONGAPAN(KAST.ENTG) GR-II	5,20	32,7	N.gas	
ZEYNEP GİYİM SAN. GR-I	1,17	9,0	N.gas	
OTOP DÜZELTME	0,02		Renew.+wastes	
OTOP DÜZELTME	-0,19		N.gas	
OTOP DÜZELTME	-7,20		N.gas+liquid	
OTOP DÜZELTME	-1,02		F.oil	
OTOP DÜZELTME	2,11		Solid+liquid	
OTOP DÜZELTME	0,06		Lignite	
OTOP DÜZELTME	-0,30		Naphtha	
OTOP DÜZELTME	0,61		D.oil	
AK ENERJİ(K.paşa) GR- III	40,00	256,9	N.gas	
AK ENERJİ(K.paşa) GR I-II	87,20	560,1	N.gas	
ALTEK ALARKO GR I-II	60,10	420,0	N.gas	
BİS ENERJİ GR VII	43,70	360,8	N.gas	
CAN ENERJİ GR-I	3,90	28,0	N.gas	
ÇEBİ ENERJİ BT	21,00	164,9	N.gas	
ÇEBİ ENERJİ GT	43,37	340,1	N.gas	
ENTEK ELK.A.Ş.KOÇ ÜNİ.GR I-II	2,33	19,0	N.gas	
KAREGE GR IV-V	18,06	141,9	N.gas	
KARKEY(SİLOPİ-4) GR-IV	6,15	47,2	Fuel-oil	
KARKEY(SİLOPİ-4) GR-V	6,75	51,9	Fuel-oil	23.12.2005
METEM ENERJİ(Hacışıramat) GR I-II	7,83	58,0	N.gas	
METEM ENERJİ(Peliklik) GR I-II-III	11,75	89,0	N.gas	
NOREN ENERJİ GR-I	8,73	70,0	N.gas	
NUH ENERJİ-2 GR I	46,95	319,7	N.gas	

ZORLU ENERJİ KAYSERİ GR-I-II-III	149,87	1144,1	N.gas	
ZORLU ENERJİ KAYSERİ GR-IV	38,63	294,9	N.gas	
ZORLU ENERJİ YALOVA GR I-II	15,93	122,0	N.gas	
TEKTUĞ(Kargılık) GR I-II	23,90	83,0	Run of river	
İÇTAŞ ENERJİ(Yukarı Mercan) GR I-II	14,19	44,0	Run of river	
MURATLI GR I-II	115,00	444,0	Dam	
BEREKET EN.(DALAMAN) GR XIII-XIV-XV	7,50	35,8	Run of river	
YAMULA GRUP I-II	100,00	422,0	Dam	
SUNJÜT(RES) GR I-II	1,20	2,4	Wind	
TOTAL	**2026,02**	**13755,9**		

Table 31: CDM Projects benefitting from VER revenues

Year-Start to Operation	Name of the Power Plant	Installed Capacity (MW)	Electricity Generation (GWh)	Type
	BAKİ ELEKTRİK ŞAMLI RÜZGAR	36		
2009	BAKİ ELEKTRİK ŞAMLI RÜZGAR	33	337,33	Wind
2008	BAKİ ELEKTRİK ŞAMLI RÜZGAR	21	60,943	Wind
2008	DATÇA RES (Datça)	8,1	3,778	Wind
	DATÇA RES (Datça)	0,8		
	DATÇA RES (Datça)	8,9		
2009	DATÇA RES (Datça) (İlave)	11,8	61,0135	Wind
2008	ERTÜRK ELEKTRİK Çatalca RES	60	65,961	Wind
2008	İNNORES ELK YUNTDAĞ RÜZG. (Aliağa)	42,5	98,058	Wind
2008	LODOS RES (Taşoluk) (G.O.P./İSTANBUL)	24	25,714	Wind
2008	SAYALAR RÜZGAR (Doğal Enerji)	30,6	53,925	Wind
2008	SEBENOBA (DENİZ ELK.) (Samandağ-HATAY)	31,2	46,919	Wind
2009	DEĞİRMENÜSTÜ EN. (KAHRAMANMARAŞ)	12,9	35,425	Hydro
2008	HAMZALI HES (TURKON MNG ELEKTRİK)	16,7	2,9	Hydro
2008	ÇALDERE ELK.(ÇALDERE HES)Dalaman-MUĞLA	8,7	11,2	Hydro
2006	TEKTUĞ(Kalealtı) GR I - II	15	52	Hydro
2009	ÜTOPYA ELEKTRİK (DÜZOVA RES)	15	46	Wind
	ROTOR ELEKTRİK (OSMANİYE RES)	17,5		
	ROTOR ELEKTRİK (OSMANİYE RES)	17,5		
2009	ROTOR ELEKTRİK (OSMANİYE RES)	22,5	218	Wind
2009	BORASKO ENERJİ (BANDIRMA RES)	24	95,46	Wind
2009	ALİZE ENERJİ (SARIKAYA RES) (Şarköy)	28,8	96	Wind
2009	ÖZTAY ENERJİ (GÜNAYŞE REG.VE HES)	8,3	29	Hydro
2009	AK ENERJİ (AYYILDIZ RES)	15	51	Wind
2009	FİLYOS ENERJİ (YALNIZCA REG. VE HES)	14,4	67	Hydro
2009	KORES KOCADAĞ RES (Urla/İZMİR)	15	56	Wind

2009	ITC-KA ENERJİ MAMAK KATI ATIK TOP.MERK.	2,8	21,062	Waste
2009	ALİZE ENERJİ (KELTEPE RES)	18,9	65	Wind
	AYEN ENERJİ A.Ş. AKBÜK RÜZGAR	16,8		
2009	AYEN ENERJİ A.Ş. AKBÜK RÜZGAR (İlave)	14,7	123	Wind
	BELEN ELEKTRİK BELEN RÜZGAR-HATAY	15		
2009	BELEN ELEKTRİK BELEN RÜZGAR-HATAY	15	95	Wind
	MAZI-3 RES ELEKT.ÜR. A.Ş. (MAZI-3 RES)	10		
2009	MAZI-3 RES ELEKT.ÜR. A.Ş. (MAZI-3 RES)	12,5	79	Wind
	SOMA ENERJİ ÜRETİM (SOMA RES)	18		
2009	SOMA ENERJİ ÜRETİM (SOMA RES)(İlave)	10,8		
	SOMA ENERJİ ÜRETİM (SOMA RES)(İlave)	16,2	150	Wind
2009	ANADOLU ELEKTRİK (ÇAKIRLAR HES)	16,2	60	Hydro
		Total	**2.106,6885**	

Table 32: Electricity generation from capacity additions by fuel type

Year	**2005**	**2006**	**2007**	**2008**	**2009**	
Fuel Type	**Electricity generation (GWh)**					**Total**
Sub-bituminous Coal	1125.00				2868.33	3993.33
Lignite		7020.00	3.1		3	7023.00
Fuel-oil	51.90		805.40	16.40	777.79	1651.49
Diesel Oil			21.20			21.20
LPG						
Naphtha				578.60		578.60
Natural Gas	537.40	3457.20	3401.90	2050.30	10.089.16	19535.96
Wind		1.90		355.30	1649.7115	2006.91
Geothermal		55.70		14.10	313	382.80
Hydro		484.20	1217.00	269.53	2372.425	4343.15
Renewable +Waste		42.20	11.10		166.715	220.02
Total	1714.30	11061.20	5456.60	3284.23	18240.13	
	39756.45					

Capacity addition between 2005 and 2009 = **39756.45** GWh which is above 20% of total electricity generation in year 2009: 194812.9 GWh. The capacity addition is composed of the set of power units in the electricity system commissioned between 2009 and 2006 and for the year 2005, the generation of the latest starting operation dated 7 plants is added to account in order to comprise 20% of total 2009 electricity generation. Hence, the sample group is decided as the set of tables (please see annex 3). The power plants registered as CDM projects should be excluded from the set. Total electricity generation of power plants registered as CDM projects is **2106.69** GWh.

OPERATING MARGIN CALCULATION

Table 33: Heat values of fuel types for 2008-2010

	Heat Value(Tcal)			Heat Value (MJ)		
Fuel Type	**2008**	**2009**	**2010**	**2008**	**2009**	**2010**
Sub-bituminous Coal	33,310.000	35,129.750	39,546.497	139,369,061,072.602	146,982,896,223.814	165,462,568,465.940
Lignite	108,227.000	97,651.556	96,550.995	452,821,836,466.662	408,574,172,080.415	403,969,424,160.177
Fuel Oil	20,607.000	15,159.902	8,569.127	86,219,701,036.419	63,429,039,558.471	35,853,232,789.009
Diesel Oil	1,328.000	1,830.226	209.482	5,556,352,840.121	7,657,666,741.839	876,472,820.523
LPG	0.000	1.232	0.000	0.000	5,154,688.779	0.000
Naphtha	113.000	84.199	105.129	472,792,071.486	352,288,669.266	439,859,802.507
Natural Gas	189,057.000	186,265.807	194,487.255	791,014,607,601.409	779,336,254,323.642	813,734,797,956.702

Table 34: The consumption of fuel types between 2008-2010

	FC (tones (gas: 10^3m^3))		
Fuel Type	**2008**	**2009**	**2010**
Sub-bituminous Coal	6,270,008	6,621,177	7,419,703
Lignite	66,374,120	63,620,518	56,689,392
Fuel Oil	2,173,371	1,594,321	891,782
Diesel Oil	131,206	180,857	20,354
LPG	0	111	0
Naphtha	10,606	8,077	13,140
Natural Gas	21,607,635	20,978,040	21,783,414

Table 35: Electricity production from plants, low-cost/must-run production, its exclusion and share of it.

Electricity Generation (GWh / Year)	**2006**	**2007**	**2008**	**2009**	**2010**
Thermal Total	131835.1	155196.17	164139.3	156923.44	155827.61
Hydro + Geothermal + Wind Total	44464.7	36361.92	34278.7	37889.47	55380.11
Turkey's Total	176299.8	191558.09	198418	194812.92	211207.73
Share of low-cost/must-run production	25.22	18.98	17.28	19.45	26.22
Average share of low-cost/must-run (%)	**21.43**				

Table 36: Heat Values, FC, NCV and $EFCO_2$, EG net+ import, simple operation margin CO_2 emission factor values of each fuel source in 2008

2008						
Fuel type	**FC [tonnes(gas: 10^3m^3)]**	**Heat value (MJ)**	**NCV (MJ/kg)**	**$EFCO_2$ (kg/TJ)**	**$EG_{net+import}$ (GWh)**	**$EF_{grid,Omsimple,v}$ (tCO2/MWh)**
Sub-bituminous Coal	6,270,008	139,369,061,072.602	22.228	92,800	157,706.571	0.08201
Lignite	66,374,120	452,821,836,466.662	6.822	90,900	157,706.571	0.26100
Fuel Oil	2,173,371	86,219,701,036.419	39.671	75,500	157,706.571	0.04128
Diesel Oil	131,206	5,556,352,840.121	42.348	72,600	157,706.571	0.00256
LPG	0	0.000	0.000	61,600	157,706.571	0.00000
Naphtha	10,606	472,792,071.486	44.578	69,300	157,706.571	0.00021
Natural Gas	21,607,635	791,014,607,601.409	36.608	54,300	157,706.571	0.27235

TOTAL	**0.65941**

Table 37: Heat Values, FC, NCV and EFCO2, EG net+ import, simple operation margin CO2 emission factor values of each fuel source in 2009

2009						
Fuel type	**FC (tonnes(gas: 10^3m^3))**	**Heat value (MJ)**	**NCV (MJ/kg)**	**$EFCO_2$ (kg/TJ)**	**$EG_{net+import}$ (GWh)**	**$EF_{grid.Omsimple.v}$ (tCO2/MWh)**
Sub-bituminous Coal	6,621,177	146,982,896,224	22.199	92,800	151,144.656	0.09024
Lignite	63,620,518	408,574,172,080	6.422	90,900	151,144.656	0.24572
Fuel Oil	1,594,321	63,429,039,558	39.784	75,500	151,144.656	0.03168
Diesel Oil	180,857	7,657,666,742	42.341	72,600	151,144.656	0.00368
LPG	111	5,154,689	46.439	61,600	151,144.656	0
Naphtha	8,077	352,288,669	43.616	69,300	151,144.656	0.00016
Natural Gas	20,978,040	779,336,254,324	37.150	54,300	151,144.656	0.27998
					TOTAL	**0.65147**

Table 38: Heat Values, FC, NCV and EFCO2, EG net+ import, simple operation margin CO_2 emission factor values of each fuel source in 2010

2010						
Fuel type	**FC [tonnes(gas: 10^3m^3)]**	**Heat value (MJ)**	**NCV (MJ/kg)**	**$EFCO_2$ (kg/TJ)**	**$EG_{net+import}$ (GWh)**	**$EF_{grid.Omsimple.v}$ (tCO2/MWh)**
Sub-bituminous Coal	7,419,703	165,462,568,465.940	22.300	92,800	150,426.641	0.10208
Lignite	56,689,392	403,969,424,160.177	7.126	90,900	150,426.641	0.24411
Fuel Oil	891,782	35,853,232,789.009	40.204	75,500	150,426.641	0.01799
Diesel Oil	20,354	876,472,820.523	43.061	72,600	150,426.641	0.00042
LPG	0	0.000	0.000	61,600	150,426.641	0.00000
Naphtha	13,140	439,859,802.507	33.475	69,300	150,426.641	0.00020
Natural Gas	21,783,414	813,734,797,956.702	37.356	54,300	150,426.641	0.29374
					TOTAL	**0.65854**

Table 39: 2008-2010 generation weighted average of simple operation margin CO2 emission factor

	$EF_{,grid,OMsimple,y}(tCO_2/MWh)$		
Year	2008	2009	2010
Total	0.65941	0.65147	0.65854
3-year Generation Weighted Average (tCO_2/MWh)	0.656512774		

BUILD MARGIN CALCULATION

Table 40: Average CO_2 emission factor, generation efficiency, CO_2 emission factor by fuel type in 2010

Fuel Type	**EFCO2 (kg/Tj)***	**EFCO2 (t/Gj)**	**Generation Efficiency (%)**	**$EF_{EL,m,y}$ (tCO2/MWh)**
Sub-bituminous Coal	92,800	0.0928	0.390	**0.8566**
Lignite	90,900	0.0909	0.390	**0.8391**
Fuel Oil	75,500	0.0755	0.395	**0.6881**
Diesel Oil	72,600	0.0726	0.395	**0.6617**
LPG	61,600	0.0616	0.395	**0.5614**
Naphtha	69,300	0.0693	0.395	**0.6316**

Natural Gas	54,300	0.0543	0.600	**0.3258**

Table 41: The summation of capacity addition between 2006 and 2010, CO_2 emission factor and build margin CO_2 emission factor by power source

	Capacity Addition (GWh)	EF,EL,m,y (tCO2/MWh)	Emission by source
Sub-bituminous Coal	80,910.20	0.8566	69,308.922
Lignite	203,474.80	0.8391	170,731.009
Fuel Oil	24,494.17	0.6881	16,854.467
Diesel Oil	687.40	0.6617	454.833
LPG	0.50	0.5614	0.281
Naphtha	187.46	0.6316	118.398
Natural Gas	370,174.30	0.3258	120,602.787
Wind	7,256.20	0	0
Geothermal	201,118.73	0	0
Hydro	1,211.82	0	0
Renewable + Waste	80,910.20	0	0
TOTAL	678,307.87		378,070.70

678,307.87 - 2,106.6885= **676,201.18 GWh** gives the total capacity addition without projects benefitting from VER revenues or registered to CDM.

EF,grid,BM,y (tCO2/MWh)	0.55910978419

Table 42: Combined margin emission factor (EF,grid,CM,y) for projects other than solar and wind power generation activities

EF,grid ,OMsimple,y (tCO2/MWh)	0.65651277408
EF,grid,BM,y(tCO2/MWh)	0.55910978419
EF,grid,CM,y (tCO2/MWh)	**0.607811279138**

In order to convert the data source units to the required units; 1J = 0.238846 cal. and the density of natural gas is considered to be 0.695kg.

Annex 4

MONITORING INFORMATION

Please see Section B.7 for detailed information.

Annex 5

The Official Letter of Ministry of Environment and Forestry, General Directorate of Nature Conservation and National Parks about minimum flow requirement

T.C.
ÇEVRE VE ORMAN BAKANLIĞI
Doğa Koruma ve Milli Parklar Genel Müdürlüğü

Sayı: B.18.0.DMP.0.01.03/135/ 3268
Konu: Çay Regülatörü ve HES Projesi

03.12.2010

GİRESUN VALİLİĞİNE
(İl Çevre ve Orman Müdürlüğü)

İlgi: 29.11.2010 tarihli ve B.18.4.İÇO.4.28.00.04.220.02/1180-3585 sayılı yazınız.

İlgi yazınızda Giresun İli, Espiye, Güce ve Tirebolu İlçeleri sınırları içerisinde, Özüdoc (Gelevera) Deresi üzerinde Martı Enerji Üretim Ltd. Şti. tarafından kurulması planlanan "ÇayRegülâtörü ve HES Projesi" kapsamında projeye ait can suyuna ilişkin Genel Müdürlüğümüz görüşleri talep edilmektedir.

Bu bağlamda, İlgi yazınız ekinde yer alan onaylı akım verileri ve proje tanıtım dosyasının incelenmesi neticesinde tarımsal sulama, içme ve kullanma suyu miktarları ve diğer kullanım hakları hariç olmak üzere Çay Regülatörü ve HES Projesi'nde mansaba bırakılması gereken çevresel akış miktarının *kurak dönemde (Haziran-Mart: 10 ayı) en az 1,50 m³/s* ve *yağışlı dönemde (Nisan-Mayıs: 2 ayı) en az 4,00 m³/s* olması uygun mütalaa edilmektedir.

Ayrıca inşaat aşamasında flora ve fauna türleri ile yaban hayatını etkileyecek çalışmalar ilgili olarak İl Çevre ve Orman Müdürlüğü uzmanları eşliğinde çalışmaların yürütülmesi, proje tanıtım dosyasında belirtilen tedbirlere uyulması, proje ile ilgili İl Müdürlüğüne Sulak Alanların Korunması Yönetmeliği kapsamında izin başvurusunda bulunulması, inşaat süresince canlıların üreme dönemlerinde patlatma yapılmaması, regülatörden bırakılacak su miktarının takibinin yapılabilmesi için on-line ölçüm sistemlerinin yerleştirilmesi ve ulusal ve uluslararası mevzuat açısından gerekli önlemlerin alınması gerekmektedir.

Bilgilerinizi ve gereğini rica ederim.

Sabri KIRIŞ
Bakan a.
Genel Müdür Yardımcısı