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:

Kuzkaya Weir and HEPP – Turkey

Version number of document: 01; Date: 16/04/2012
Version number of document: 02; Date: 25/01/2013

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

Kuzkaya Weir and HEPP project will be developed by Murat Kaan Elektrik Üretim A.Ş (Murat Kaan Electricity Production INC.) at Kastamonu Province, Araç District, at the Blacksea Region. Within the scope of the project, there will be two weirs linked to two power houses by independent transmission channels. Kuzkaya 1 Weir will take its water flow from Araç Creek and Kuzkaya 1 power house with an installed capacity 3.59 MWe will discharge the water to Karadere Creek. Kuzkaya 2 Weir will be established at the downstream of Kuzkaya 1 power house. Kuzkaya 2 Weir will take its water flow from Karadere Creek and discharge the flow to Araç Creek from the Kuzkaya 2 Power House with an installed capacity 2.928 MWe.[1] Total installed capacity of the proposed project is 6.518 MWe.

The annual electricity generations are 11.07 GWh and 8.82 GWh for Kuzkaya 1 HEPP and Kuzkaya 2 HEPP respectively. The total electricity generation of the project activity is expected as 19.899 GWh.[2]

Based on annual total electricity generation amount, the project activity will result in a $CO_{2\text{-eq}}$ reduction of 10,957 tons annually due to use of renewable resources. The commissioning date is expected on May 2015. The Murat Kaan Elektrik Üretim A.Ş was expected to be financially feasible by means of issuing obtained VERs by project activity.

Table 1: Milestones of the Project

TASK NAME	DATES
Prior Consideration of VER-Board Decision	31/03/2008
Feasibility Study Report submission	June 2010
Contract with EN-ÇEV (the Consultant of Carbon Credits)	July 2010
EIA Report Approval	25/03/2011
Licensing by EMRA	12/05/2011
Turbine Contract – investment decision date	25/08/2011
Expected Construction Starting Date	01/05/2013
Commissioning Date	01/05/2015

Seeking power sources which has minimum adverse effect to environment and 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

[1] Kuzkaya Weir and HEPP, Feasibility Study Report, page 1-4 and EIA, page 2
[2] Kuzkaya Weir and HEPP, Feasibility Study Report, page 1-4 and EIA, page 2

economically viable, environmentally sensible and socially responsible represent the best concept of 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.

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.[3] Sustainability considered in three headings as follows:

Socio-Economic Sustainability

- This kind of projects will increase local employment of skilled labour for the installation, operation and maintenance of equipment. The project promotes the sustainable economic development which complies with Long-Term Development Strategy of Turkey.[4]
- 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.

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."[5] 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.[6]

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

The "Tool for the demonstration and assessment of additionality, version 06.0.0" EB 65 is assessed within the PDD to demonstrate the additionality of the proposed project.

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

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)	Murat Kaan Elektrik Üretim A.Ş. (private company)	No

Murat Kaan Elektrik Üretim A.Ş. is the owner of the generation license for the project activity and therefore, legal owner of the project activity.
Full contact information for the project participants is provided in Annex 1.

EN-ÇEV Ltd. Şti. is the carbon consultant of the project activity.

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 Kastamonu / Araç District
The location of Kastamonu Province on Turkey map and the project site are given below as Figure 1.

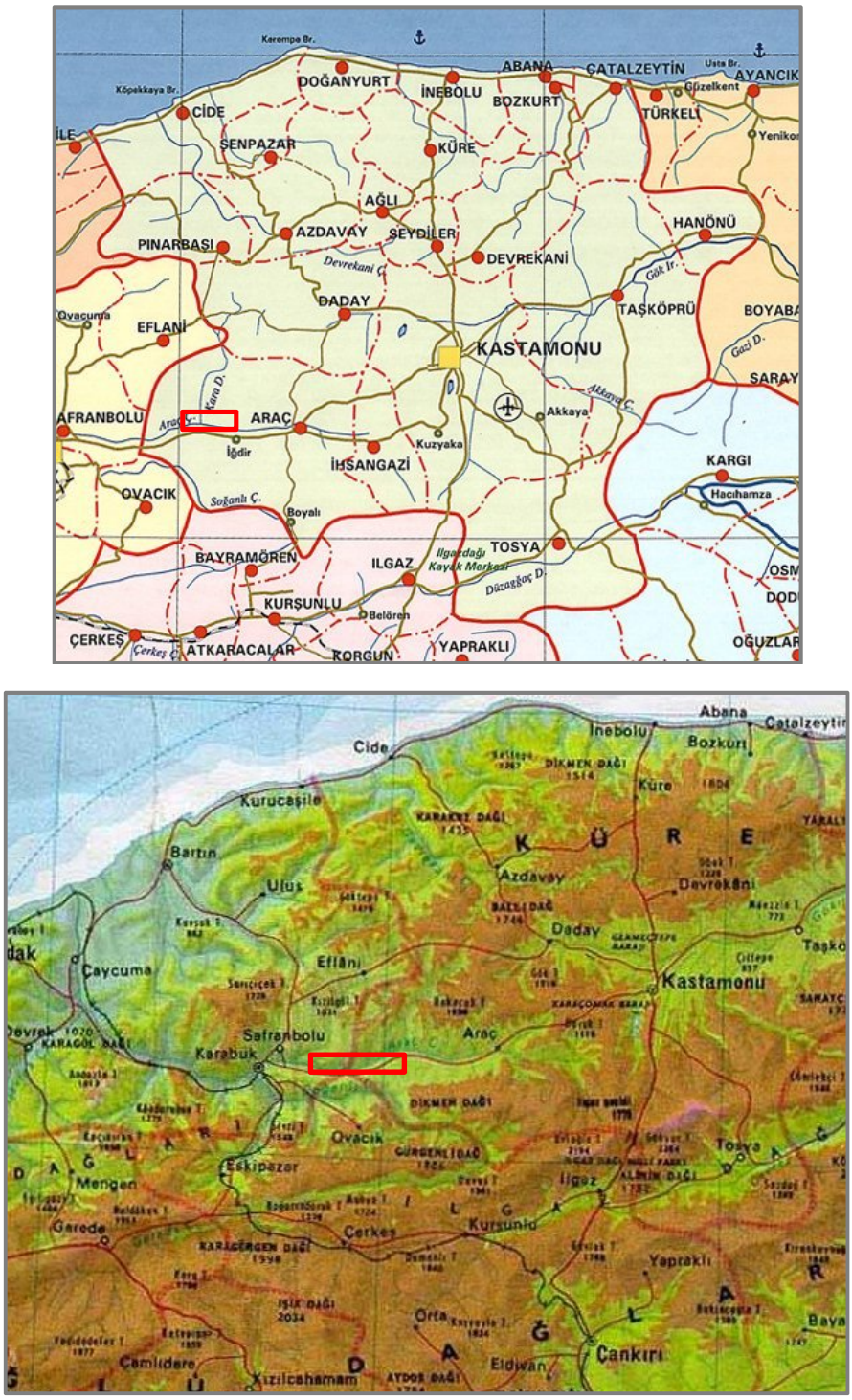

Figure 1: Identification of the Project area on Turkey map

A.4.1.3. City/Town/Community etc:

Project is located in the province of Kastamonu, Araç District.

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

Project area lies between 41° 13’ 40”- 41° 14’ 40” North latitudes and 33° 01’ 50”- 33° 07’ 30” east longitudes. The closest settlement areas are tabulated below by the distance with respect to the structure within the scope of the proposed project.

Table 2: The closest settlement and villages to the proposed project units

The structure within the scope of the project	Neighbouring site	Distance (m)	Neighbouring site direction wrt the structure
Kuzkaya Weir-1	Samatlar Village	1500	East
	A settlement	250	South east
Kuzkaya Powerhouse-1	Saltuklu Village	1300	North
	A settlement	250	South east
Kuzkaya Weir-2	Saltuklu Village	1500	North east
	Nearest settlement	1000	North east
Kuzkaya Powerhouse-2	Kayaboğazı Village	250	North
	Nearest settlement	100	North

Source: Kuzkaya Weir and HEPP, EIA, page 13, 14

The transmission channel of Kuzkaya 1 HEPP is in the borders of Samatlar, Aşağıçobanözü ve Saltuklu Villages of Araç District.

The transmission channel of Kuzkaya 2 HEPP is in the borders of Kayabaşı, Kayaboğazı, Oycalı and Saltuklu Villages of Araç District.

Table 3: Coordinates of the Project Units

Kuzkaya 1		Geographic - Decimal Degree		Kuzkaya 2		Geographic - Decimal Degree	
Unit	**Point No**	Latitude	Longitude	**Unit**	**Point No**	Latitude	Longitude
Weir	1	41.2309967	33.1186217	Weir	1	41.2434666	33.0612026
Sedimentation basin	1	41.2318858	33.1202626	Sedimentation basin	1	41.2448518	33.0620458
Transmission channel	1	41.2420370	33.0720213	Transmission channel	1	41.2338019	33.0345031
	3	41.2400828	33.0791517		3	41.2382711	33.0367937
	5	41.2357978	33.0864851		5	41.2405899	33.0476980
	7	41.2339264	33.1090920		7	41.2425181	33.0544380
Head pond	1	41.2433139	33.0707709	Head pond	1	41.2335534	33.0339948
Penstock	1	41.2428888	33.0688099	Penstock	1	41.2336309	33.0343262
	2	41.2428211	33.0710371		2	41.2334560	33.0345034
Power house	1	41.2434585	33.0659969	Power house	1	41.2333040	33.0342075

Source: *Kuzkaya Weir and HEPP, EIA Report, Cover page*

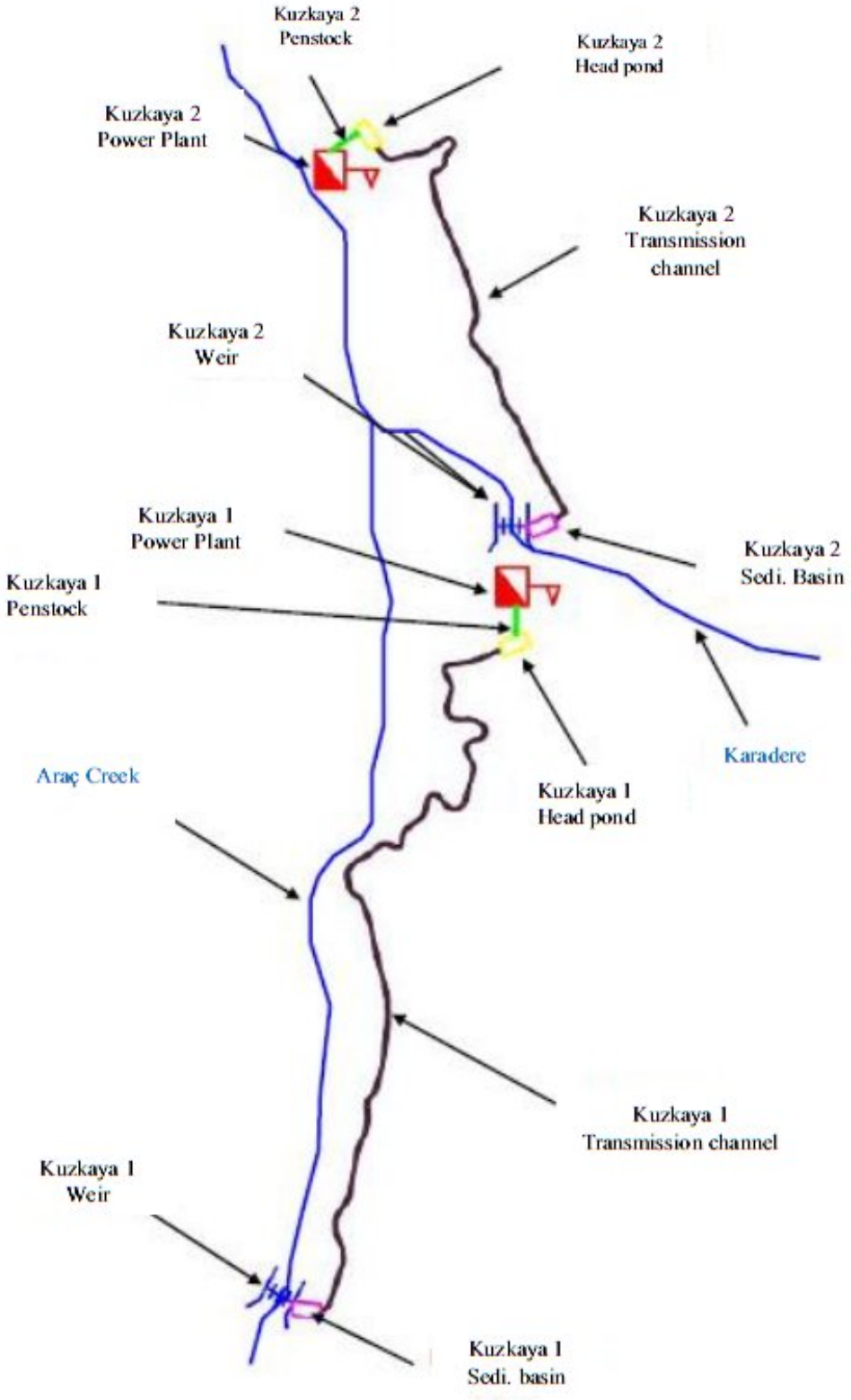

Figure 2: General Layout of the Project Units

Source: *Kuzkaya Weir and HEPP, EIA Report, page 24*

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. It has no associated large dam or reservoir. 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 tunnel or penstock, which drops from the intake. Once the water reaches the powerhouse, it is at a very 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 after the powerhouse. Further, with no large dam to alter the river's flow, the design attempts to mitigate the environmental concerns traditionally associated with commercial dam-based hydroelectric projects.

The only purpose of the proposed project is to produce energy. The generated electricity will be connected to national interconnected system for public welfare.

The units of the project activity are: Kuzkaya 1 weir, water intake structure, scouring sluice, fish passage, sedimentation basin, trapezoidal transmission channel, head pond, penstock, Kuzkaya 1 power house and tail water channel and Kuzkaya 2 Weir, water intake structure, scouring sluice, fish passage, sedimentation basin, trapezoidal transmission channel, head pond, penstock, Kuzkaya 2 power house and tail water channel.[7]

Within the project activity, the water taken by virtue of Kuzkaya Weirs (water intake structure) will be conveyed to the head pond through the transmission channel to avoid flow fluctuations and then conveyed to the power house by means of the penstock. The turbines convert the potential energy of water to mechanical energy. Then, the turbines turn up the generator and the generator produce electrical energy by converting the mechanical energy to electrical energy; the water passed from the turbines in the Kuzkaya 1 power houses will be released back to Karadere Creek without any alteration to its quality and quantity. The water passed from the turbines in the Kuzkaya 2 power house will be released back to Araç Creek without any alteration to its quality and quantity.

Technical Details of Units

Table 4: The units of the Kuzkaya 1 HEPP and Kuzkaya 2 HEPP and their characteristics

KUZKAYA 1 Units	Characteristics

[7] Kuzkaya Weir and HEPP, EIA Report, section V.2.1

Weir	▪ average flow coming to weir: 6.96 m^3/s ▪ radial gate structure with 9 gates (h:3.1 m, w:5.5 m) ▪ crest length : 59.9 m ▪ thalweg elevation: 497 m ▪ average water elevation: 499 m ▪ maximum water elevation: 500.45 m ▪ crest elevation: 501 m ▪ fish passage on the boundary wall at the left side of the creek ▪ the gate which is near the intake structure will be used as scouring sluice
Water intake structure	▪ basin elevation: 496.6 m ▪ width: 13.1 m ▪ length: 10.75 m ▪ intake transition structure length: 10 m
Sedimentation basin	▪ width: 13 m ▪ length: 50 m ▪ water depth: 3-3.5 m ▪ slope of basin: 0.01 ▪ basin elevation: 496-495.5 m ▪ exit transition structure length: 11.5 m
Transmission channel (trapezoidal channel)	▪ right side of Creek ▪ slope: 0.0003 ▪ width of basin: 3.65 m ▪ water depth : 1.94 m ▪ channel length: 5970 m ▪ project flow: 15.5 m^3/s ▪ project velocity: 1.22 m/s
Head pond	▪ ave. / min. / maxi. water elevation: 497.06 / 495.85 / 497.39 m ▪ width: 10 m ▪ length: 49 m ▪ water depth: 1.94-9.81 m ▪ volume: 594 m^3
Penstock	▪ diameter: 2 m ▪ length: 60 m ▪ pipe wall thickness: 9 mm ▪ max velocity: 5 m/s
Power house	▪ left side of Karadere Creek, 470 m elevation ▪ installed capacity: 3.590 MWe ▪ tail water elevation: 470 m ▪ gross head: 29 m ▪ max net head: 27.01 m ▪ average net head: 26.88 m ▪ minimum net head: 26.46 m ▪ 3 x horizontal axes Francis turbines ▪ firm energy : 0 GWh/year ▪ secondary energy: 11.07 GWh/year ▪ total energy: 11.07 GWh/year
Energy Transmission Line	▪ 3/0 pigeon ▪ 34.5 kV ▪ length: 5.5 km to transformer station of another HEPP

Source: *Kuzkaya Weir and HEPP, EIA Report, page 4, 5*

KUZKAYA 2 Units	Characteristics
Weir	▪ average flow coming to weir: 1.77 m^3/s ▪ radial gate structure with 4 gates (h:3.1 m, w:5.5 m) ▪ crest length : 25.9 m ▪ thalweg elevation: 467 m ▪ average water elevation: 470 m ▪ maximum water elevation: 470.55 m ▪ crest elevation: 401.45 m ▪ fish passage on the boundary wall at the left side of the creek ▪ the gate which is near the intake structure will be used as scouring sluice
Water intake structure	▪ basin elevation: 467.6 m ▪ width: 17.9 m ▪ length: 10.75 m ▪ intake transition structure length: 10 m
Sedimentation basin	▪ width: 16 m ▪ length: 50 m ▪ water depth: 3-3.5 m ▪ slope of basin: 0.01 ▪ basin elevation: 467-466.5 m ▪ exit transition structure length: 12.25 m
Transmission channel (trapezoidal channel)	▪ right side of Creek ▪ slope: 0.00025 ▪ width of basin: 4.4 m ▪ water depth : 2.16 m ▪ channel length: 3460 m ▪ project flow: 20 m^3/s ▪ project velocity: 1.21 m/s
Head pond	▪ ave. / min. / maxi. water elevation: 468.99 / 467.57 / 469.62 m ▪ width: 20 m ▪ length: 30 m ▪ water depth: 2.16-10.52 m ▪ volume: 850 m^3
Penstock	▪ diameter: 2.25 m ▪ length: 27 m ▪ pipe wall thickness: 10 mm ▪ max velocity: 5 m/s
Power house	▪ right side of Araç Creek ▪ installed capacity: 2.928 MWe ▪ tail water elevation: 452 m ▪ gross head: 18 m ▪ max net head: 16.935 m ▪ average net head: 16.888 m ▪ minimum net head: 16.726 m ▪ 3 x S type Kaplan turbines ▪ firm energy : 0 GWh/year ▪ secondary energy: 8.829 GWh/year ▪ total energy: 8.829 GWh/year
Energy Transmission Line	▪ 3/0 pigeon ▪ 34.5 kV ▪ length: 3.5 km to Kuzkaya 1 power house

Source: *Kuzkaya Weir and HEPP, EIA Report, page 5, 6*

Mitigation of Noise Pollution:

For construction phase; an assessment was conducted within the scope of EIA[8] to identify the impact of noise observed from the construction activities as per "The Regulation on The Assessment and Management of Ambient Noise", published on the official gazette date: 07/03/2008 and no: 26809. The regulation emphasizes the limit value for construction activity as 70 dBA[9]. The noise pressure levels of selected construction areas (ie: areas of Kuzkaya 1 and 2 weirs, areas of transmission channels, areas of Kuzkaya 1 and 2 power houses) were calculated by using the noise levels of to be used heavy vehicles[10] during construction. Then, the impact of noise level of the area to the closest settlement was assessed. The result of the assessment was tabulated as;

Table 5: The Impact of Noise Levels of Construction Areas to Closest Settlements[11]

Construction Area	Closest Settlement	Noise Level Calculated	Result
Kuzkaya 1Weir	250 m	58.65 dBA	Below the limit value
Kuzkaya 2Weir	1000 m	46.61 dBA	Below the limit value
Kuzkaya 1Transmission	100 m	68.01 dBA	Below the limit value
Kuzkaya 2Transmission	700 m	51.11 dBA	Below the limit value
Kuzkaya 1Power House	250 m	60.55 dBA	Below the limit value
Kuzkaya Power House	100 m	68.51 dBA	Below the limit value

Hence, the noise levels of specific construction areas were detected lower than the limit value with respect to the distance in between.

For operation phase; no heavy vehicles which can result in noise pollution will be operated. Only source of noise can be electromechanical equipment in the power houses. In order to mitigate the noise level of equipment, closed type power houses will be constructed.

Mitigation of PM, Dust and Emission Pollution:

For construction phase; an assessment was conducted within the scope of EIA[12] to identify the amount of to be formed PM and dust. The limit values of PM and dust were specified with respect to the "Regulation on the Control of Industrial Air Pollution" and "Regulation on the Assessment and Management of Air Quality" as for short term: 140 $\mu g/m^3$ and 390 $mg/m^2/day$ and for long term: 78 $\mu g/m^3$ and 210 $mg/m^2/day$ respectively for the year 2013.[13]

The calculations for the amount of PM and dust formation were performed by MATCAD and enclosed to Annex 15 of EIA Report. The results are as follows;

Table 6: The PM and Dust Amount to be Formed during Construction Phase[14]

	Area	Short Term (24 hrs.)	Long Term (Annual)

[8] Kuzkaya Weir and HEPP, EIA Report, Section V.1.20 and Annex 16
[9] decibel A-weighting, an environmental noise measurement
[10] Due to the nature of the assessment, it was be assumed that, all heavy vehicles will be used at the same time. However, it is not possible in reality. Hence, the real noise level will be lower than the calculated ones.
[11] Kuzkaya Weir and HEPP, EIA Report, page 145
[12] Kuzkaya Weir and HEPP, EIA Report, page 118-120 and Annex 15
[13] The specified limit values in the regulation have a descending order for the subsequent years: 2008-2014 as transition period.
[14] Kuzkaya Weir and HEPP, EIA Report, page 119

PM	Kuzkaya 1Weir Area Uncontrolled Situation	74.54 µg/m3	14.43 µg/m3
	Kuzkaya 1Transmission Channel Area Uncontrolled Situation	26.6 µg/m3	5.12 µg/m3
	Kuzkaya 1 Power House Area Uncontrolled Situation	47.09 µg/m3	9.1 µg/m3
	Kuzkaya 2Transmission Channel Area Uncontrolled Situation	13.21 µg/m3	2.5 µg/m3
	Kuzkaya 2 Power House Area Uncontrolled Situation	16.26 µg/m3	3.13 µg/m3
	Area	**Short Term (24 hrs.)**	**Long Term (Annual)**
Dust	Kuzkaya 1Weir Area Uncontrolled Situation	367.34 mg /m2-gün	70.83 mg/m2-gün
	Kuzkaya 1Transmission Channel Area Uncontrolled Situation	133.0 mg /m2-gün	25.64 mg/m2-gün
	Kuzkaya 1 Power House Area Uncontrolled Situation	234.76 mg /m2-gün	45.26 mg/m2-gün
	Kuzkaya 2Transmission Channel Area Uncontrolled Situation	66.8 mg/m2-gün	12.74 mg/m2-gün
	Kuzkaya 2 Power House Area Uncontrolled Situation	80.86 mg/m2-gün	15.59 mg/m2-gün

It is concluded that, the expected and calculated PM and dust formation will not exceed the regulated limit values.

In addition to that for mitigate the formation of dust and PM[15];

- Care to empting/fulfilling of trucks without blowing about,
- Speed restrictions to heavy vehicles,
- Spraying activities of roads during construction.

For operation phase; no emission pollution will be observed since the project activity is a HEPP and it is not an emission source by its nature.

Mitigation of Impact of Explosions:

No explosive material will be used up during construction or operation phases of project activity.[16]

Excavated Material and Its Temporal Storage:

Another assessment regarding amount of excavated soil was conducted in the EIA[17]. The excavation will be stored temporarily at the formerly specified and permitted storage area. There were specified three temporary storage areas. The excavation and top soil will be stored separately at those areas. Then, the excavation will be reused for landfilling, backfilling, road repair and service road building purposes.

It was indicated that, the 20% of the excavated material will be topsoil (vegetable soil) and stored topsoil will be reused for landscaping and reclamation purposes. The residual excavation (if any) will be reused at the repair of village roads upon the request of Kastamonu Provincial Directorate or disposed to solid waste disposal site by the permission of Araç Municipality.[18]

[15] Kuzkaya Weir and HEPP, EIA Report, page 119,120
[16] Kuzkaya Weir and HEPP, EIA Report, page 131
[17] Kuzkaya Weir and HEPP, EIA Report, section V.1.17 and page 141
[18] Kuzkaya Weir and HEPP, EIA Report, page 141

The excavation shall not be poured to river bed, which is strictly forbidden by laws. The project activity will be complied with the "Regulation on the Control of Excavation, Construction and Ruins Waste".

The completion time of the project -total construction time- will be nearly 2 years[19].
The expected operational lifetime of the project is estimated at about 45 years 11 days.[20]

Small HEPP projects are among the projects with minimal impact on environment and local people. No environmentally harmful emission is anticipated. 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 on the Control of Solid Wastes" and "Regulation on the Control of Water Pollution". [21]

Furthermore, along the transmission channel, some bridges will be constructed to maintain the access of local people and other ecosystem components. All precautions will be provided for protection. During the construction, the transportation shall not be disrupted. In case of any damage to the existing roads or infrastructure despite of the precautions and mitigation measures, the damaged roads will be repaired and damage to infrastructure will be covered by the project owner.

The generated electricity will be connected to national interconnected system by Araç Transformer Station.[22]

Minimum Flow;

The project designed as a hydroelectric power plant which does not consume water while operating. Water that will be diverted to the transmission channels will be released back to the creek to Creek without any pollution or chemical/physical/quantitative alteration. In this respect, no water will be consumed.

The specified amount of flow shall and will be released for sustainability. The ecological flow amount and water rights of downstream users are the key concerns, releasing of those after weir structure preserve the ecological life/habitat and provide concord with downstream users and stakeholders respectively. The released water to creek will be continuously measured by an online flow meter at where it is positioned by the 23rd Regional Directorate of DSI[23] and in conjunction with online system of the DSI.[24]

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 stimulate the natural flow regime and sustain the ecology in the river basin. 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:

[19] Kuzkaya Weir and HEPP, EIA Report, page 6
[20] See Section C.1.2 for detailed information
[21] Kuzkaya Weir and HEPP, page 197
[22] Kuzkaya Weir and HEPP, EIA Report, page 3
[23] The State Hydraulic Works
[24] Kuzkaya Weir and HEPP, EIA Report, page 165

27323, date: 18/08/2009, the minimum flow (ecological flow) should be released to creek to sustain ecosystem components.

For the project activity, in order to sustain the ecosystem hydrological regime during the months; July and August having the lowest flow in the year, the water flow is not going to be diverted to transmission channels for both Kuzkaya 1 and 2. The water intake structures are going to be closed and all coming water flow to weirs is going to be released to water bed. In this regard, the Kuzkaya 1 HEPP and Kuzkaya 2 HEPP will not generate electricity in July and August.[25]

Table 7: The Amount of Minimum (Ecological) Flow Released from Kuzkaya 1 and 2 Weirs in a year[26]

	Minimum (ecological) flow	
Months	**Kuzkaya 1 Weir**	**Kuzkaya 2 Weir**
January	450 l/sec	260 l/sec
February	1250 l/sec	260 l/sec
March	1250 l/sec	260 l/sec
April	1250 l/sec	260 l/sec
May	1250 l/sec	260 l/sec
June	1250 l/sec	260 l/sec
July	All coming flow	All coming flow
August	All coming flow	All coming flow
September	450 l/sec	260 l/sec
October	450 l/sec	260 l/sec
November	450 l/sec	260 l/sec
December	450 l/sec	260 l/sec

Downstream Users' Water Rights;

The quantity of downstream users' water rights was determined within the scope of EIA. The **Downstream Users' Water Rights Report**[27] was conducted and specified the water amount that have been using for irrigational purposes, for wells, watermills, or for drinking purposes between the weir and the power house. As per the report, the irrigation area for agriculture between Kuzkaya 1 weir and power house is 210 ha and between Kuzkaya 2 Weir and power house is 22 ha. The length of the river bed between Kuzkaya 1 weir and powerhouse is 6,500 m[28] and the length between Kuzkaya 2 Weir and power house is estimated roughly 2,000 m. The required amount of irrigation water has to be released from weir and the amount during the months of irrigation.[29]

Table 8: The Water Released for Irrigational Purposes (l/sec) from Kuzkaya 1and 2 Weirs by Irrigation Months [30]

	Q released for irrigation	
Months	**Kuzkaya 1 Weir**	**Kuzkaya 2 Weir**

[25] Kuzkaya Weir and HEPP, EIA Report, page 162,163
[26] Kuzkaya Weir and HEPP, EIA Report, page 162,163
[27] Kuzkaya Weir HEPP, EIA Report, Annex 21
[28] Kuzkaya Weir and HEPP, EIA Report, page 161
[29] Kuzkaya Weir and HEPP, EIA Report, page 163
[30] Kuzkaya Weir and HEPP, EIA Report, page 162-164 and Annex 21

May	16.88 l/sec	5.72 l/sec
June	33.76 l/sec	7.7 l/sec
July	All coming flow	All coming flow
August	All coming flow	All coming flow
September	23.21 l/sec	1.76 l/sec

An assessment[31] was conducted by Black Sea Technical University in order to specify the impact of proposed project to off-legal wells which mean that they were not opened by DSI or any authority. Therefore, the reliable and safe drawing amounts are not known. The University assessed the site, topographic, water level and etc. to investigate in what degree the project activity will affect the water wells. The assessment concludes that the underground water level increases from the water level of river towards the slopes and the lowest underground level is detected at the connection points of river and underground water level and finally in all cases the underground water feds the Araç Creek. Therefore, any problem on the decrease of water level of wells is not foreseen directly. In this respect, any amount of flow for well will not left from weir structure to creek.

The project owner committed to take all precautions against the problems by reason of the decrease of water level in wells.

The flow released after weir structure which composes of minimum (ecological) flow and water utilization right shall always be measured by a flow meter to monitor the amount. The establishment of flow meter is obligatory and under responsibility of the project owner. The flow meter is linked to the State Hydraulic Works with an online system and measured continuously.[32]

Table 9: The Total Amount of Water to be released from Weir Structures (the summation of minimum flow and water flow for irrigation)

Months	Released from Kuzkaya 1 weir	Released from Kuzkaya 2 weir
January	**450 l/sec**	**260 l/sec**
February	**1250 l/sec**	**260 l/sec**
March	**1250 l/sec**	**260 l/sec**
April	**1250 l/sec**	**260 l/sec**
May	1250 + 16.88 = **1266.88 l/sec**	260 + 5.72 = **265.72 l/sec**
June	1250 + 33.76 = **1283.76 l/sec**	260 + 7.7 = **267.7 l/sec**
July	**All coming flow**	**All coming flow**
August	**All coming flow**	**All coming flow**
September	450 + 23.21 = **473.21 l/sec**	260 + 1.76 = **261.76 l/sec**
October	**450 l/sec**	**260 l/sec**
November	**450 l/sec**	**260 l/sec**
December	**450 l/sec**	**260 l/sec**

[31] Kuzkaya Weir and HEPP, EIA Report, page 164,165 and Annex 22
[32] Kuzkaya Weir and HEPP, EIA Report, page 165

Kuzkaya 1 and Kuzkaya 2 HEPP project were designed without reservoirs. The backwater formed by the way of weir structure is for regulation of coming flow. The area of backwater before the Kuzkaya 1 Weir will be 10,000 m^2 and the area of backwater before the Kuzkaya 2 Weir will be 15,000 m^2.[33]

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 mitigation measures will be performed to provide the least disturbance to the vegetation, floral and faunal species and environment.[34]

An endemic species were not determined based on the on-site surveys and studies during the preparation of EIA.[35] The risk is neither for fauna nor for floral species. In order to stimulate the natural flow regime and sustain the fish living, fish passages under the weir structure will be constructed.[36] Besides, fish migration is provided by fish passage[37] which is designed properly to provide the transition of fishes.

A *Social Impact Assessment Report*[38] was conducted by an expert in order to identify the social impacts can be occurred based on the proposed project. The main point of this report was about the concern of local people on reduction in the water flow of Araç Creek. The importance of the water utilization rights was expressed. With respect to the report, the proposed project cause a decrease in the flow of Araç Creek and which may affect the agricultural activities. To sustain the agricultural activities and avoid considering it as a threat by local people, the specified amount of water should be released from weir structure. Moreover, as mentioned above, in July and August, the water will not transmitted to operate the power house. Therefore, the concerns of local people are taken off.

The preference of using the labour force from the vicinity may be helpful to procure acceptance of proposed project.[39]

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, 19.89 GWh, the project activity will result in a CO_2-eq reduction of 10,957 tons annually.

The scenario existing prior to the project activity is non-existence of a power plant. In this respect, 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. The baseline scenario is the same as the scenario existing prior to the project activity.

[33] Kuzkaya Weir and HEPP, EIA Report, page 29
[34] Kuzkaya Weir and HEPP, EIA Report, section IV.2.11
[35] Kuzkaya Weir and HEPP, EIA Report, page 81 and 86
[36] Kuzkaya Weir and HEPP, EIA Report, page 103
[37] Kuzkaya Weir and HEPP, EIA Report, page 103 and 153
[38] Kuzkaya Weir and HEPP, EIA Report, Annex 18
[39] Kuzkaya Weir and HEPP, EIA Report, section V.3.1

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

Table 10: Estimated amount of overall emission reductions by years

Year	Annual estimation of emission reductions in tonnes of tCO2-eq
May – December 2015 (for 8 months)	7,305
2016	10,958
2017	10,958
2018	10,958
2019	10,958
2020	10,958
2021	10,958
January-April 2022 (for 4 months)	3,653
Total number of crediting years	**7**
Total emission reductions (tonnes of CO2-eq)	76,705
Annual average over the crediting period of estimated reductions (tonnes of CO2-eq)	**10,958**

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

The project does not obtain public funding. (Please see Annex 2: ODA Declaration)

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 two projects in the scope of subject above; the proposed project Kuzkaya Weir and HEPP and the other Samatlar HEPP project. These are individual projects since, the electricity production licences are separate and owned by different Firms. The Samatlar HEPP project has a production licence no. EÜ/3191-5/1921[40] and owned by "RAK A.Ş." The Kuzkaya Weir and HEPP project has a production license numbered as EÜ/3210-9/1946 and owned by "Murat Kaan Elektrik Üretim A.Ş."

[40] Retrieved from http://www2.epdk.org.tr/lisans/elektrik/lisansdatabase/verilenuretim.asp

Based on the water basin plan, the Samatlar weir and power house will be located at the upstream of Kuzkaya 1 Weir on the Araç Creek.

The investment decisions, Feasibility Study Reports and their approvals by State Hydraulic Works and EIA Reports of the projects are independent.

Hence, the projects are not a debundled component of a large scale project activity.

Another hydropower project is planned at the upstream of Kuzkaya Weir and HEPP project which is named as Zala HEPP and has a production licence no. EÜ/2899-49/1746. The mentioned project is not a debundled component of a large scale project or any other project, on the occasion of that its the electricity production licenses, investment decisions, Feasibility Study Reports and their approvals by State Hydraulic Works and EIA Reports are all independent.

Moreover, Zala HEPP project is not in the 1km of the project boundary of the proposed project. In this respects, the proposed project, Kuzkaya Weir and HEPP project is not a bundling component of any other project.

Thereby, according to the "Guidelines on Assessment of Debundling for SSC Project Activities, version 03", the proposed project is eligible to use the simplified modalities and procedures for small-scale CDM project activities. The project activity will follow the regular CDM modalities and procedures.

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:

- "Tool for the 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.

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 6.518 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 6.518 MWe installed capacity.

Further, the project activity results in a small ponding area up to the weir structure to regulate the coming flow. The power density resulting by the project activity is calculated as 260.72 W/ m^2 under the section B.6.3 of PDD. 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:

Regarding the "General Guidelines to SSC CDM methodologies version 17", Annex 21, EB 61; *"The project boundary shall be limited to the physical project activity. Project activities that displace energy supplied by external sources shall earn certified emission reductions (CERs) for the emission reductions associated with the reduced supply of energy by those external sources."*

Hence, the Project boundary is where the physical Project activity occurs.

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.
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 11: 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 proposed project and the power plants which are connected to the Turkish National Grid are included in the spatial extent of the project boundary.

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%.[41]

Table 12: Breakdown of Installed Capacity of Turkish Grid, 2010[42]

Primary Energy Source	MW	% of Installed Capacity, 2010
Thermal	32278.5	65.18%
Hydro	15831.2	31.97%
Geothermal + Wind	1414.4	2.86%
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[43] which corresponds to an increase of 8.4% compared to the previous year. The increase or decrease rates for electricity are presented in Table 13 below.

Table 13: The Energy Demand and Increase Rates between Years 2001-2010[44]

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

[41] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m(13-21)/13.xls
[42] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m(13-21)/13.xls
[43] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/23.xls
[44] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/23.xls

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[45] (Refer to Figure 3 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 [46] . Nevertheless, the European Union places great emphasis on green power in energy policies (hydroelectric, wind, solar, and biomass energies).[47] 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.

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".

[45] Retrieved from http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf
[46] Retrieved from http://www.dsi.gov.tr/english/service/enerjie.htm
[47] Retrieved from http://www.thegreenpowergroup.org/policy.cfm?loc=eu

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:

As required in the Gold Standard "Voluntary Emission Reductions Manuel for Project Developers", the project additionality is demonstrated through use of the "Tool for the demonstration and assessment of additionality, version 06.0.0".

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 14: Alternatives to the project activity

Alternative A	Proposed project developed without the VER revenues
Alternative B	The continuation of the current situation (no project activity & no other alternative undertaken)
Alternative C	Construction of a thermal power plant with the same installed capacity or the same annual power output.

Alternative A is the implementation of the project without carbon revenue.

Alternative B is the continuation of current situation, no project activity. Alternative B does not seem as a realistic option due to expected energy demand increase in Turkey. The energy demand of Turkey is expected to expand at an average of % 6.3- % 7 until 2018[48]. In addition; the Figure 3 below shows the energy demand projection (conservative scenario) between 2010 and 2019 prepared by TEİAS. Based on this fact, the electric generation of 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. [49]

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

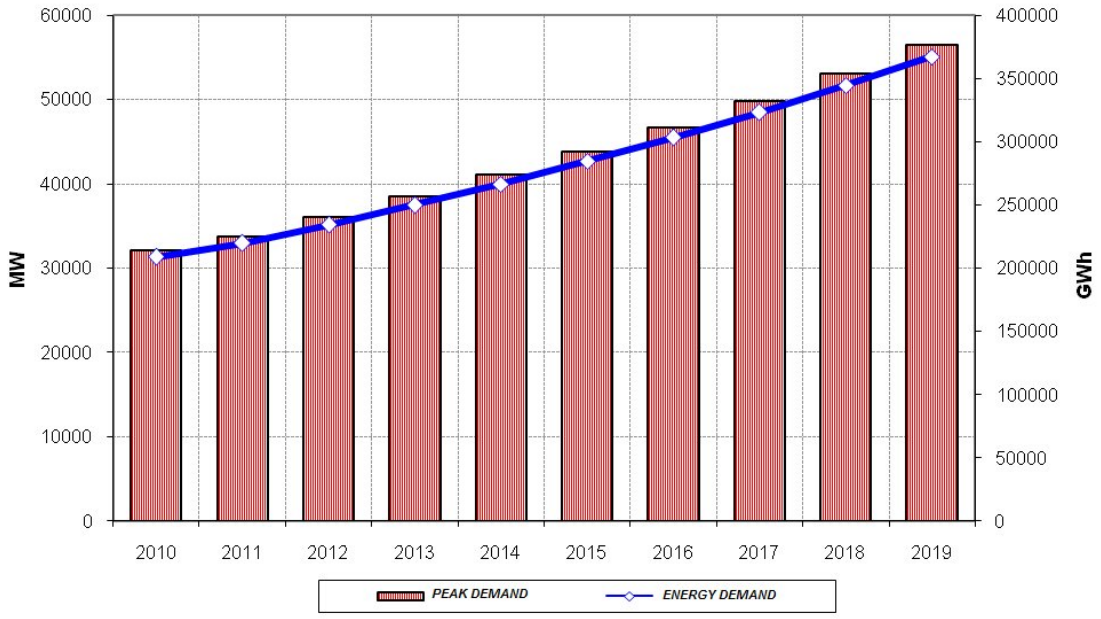

Figure 3: The Energy Demand Projection between 2010 and 2019 (Low Demand)[50]

The last alternative, Alternative C, is considered as a significant alternative to the project activity with respect to the baseline scenario. Since the share of thermal plants in the installed capacity of Turkey is considerably high which corresponds 65.18 %[51] of total installed capacity according to 2010 Turkish electrical statistics retrieved from official data of TEIAS (Turkish Electricity Transmission Company).

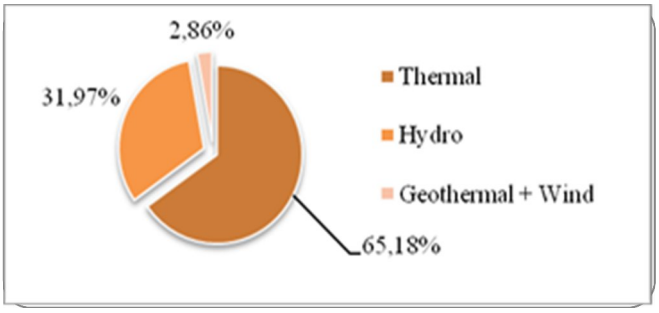

Figure 4: The distribution of installed capacity of Turkey by primary energy sources in 2010[52]

Outcome of Step 1a

Three alternatives are considered for the proposed project. However due to the increasing electricity demand in Turkey, Alternative B, which is the continuation of the current situation is an unrealistic option. Therefore, Alternatives A and C are the two alternatives to be evaluated.

[50] Retrieved from http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf, Page 13
[51] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m(13-21)/13.xls
[52] 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][53]
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][54]
3. Environment Law [Law Number: 2872 Ratification Date: 09.08.1983 Enactment Date: 11.08.1983][55]
4. Energy Efficiency Law [Law Number 5627, Enactment Date 02/05/2007] [56]
5. Forest Law [Law Number 6831, Enactment Date 31/08/1956][57]

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

Outcome of Step 1b

Mandatory legislation and regulations for each alternative are taken into account in sub-step 1b. Based on the above analysis, the proposed project activity is concluded not to be the only alternative amongst the ones considered by the project participants that is in compliance with mandatory regulations.

Step 2: Investment analysis

The investment analysis for Kuzkaya 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 the demonstration and assessment of additionality, version 06.0.0" lists three possible analysis methods;

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

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

Option I cannot be used, since the financial and economic benefits generated by the proposed project activity.

Between Option II and Option III, benchmark analysis method (Option III) is preferred as the investment analysis method for the proposed project.

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. Since this IRR refers to small Hydropower plant in the republic of Turkey, the Equity IRR of World Bank can be used which is 15% for small hydro.[58] This accepted benchmark IRR provides a more accurate and conservative view of the investment analysis effort. Eventually, the benchmark (15%) will be applied for comparison with the equity IRR determined in this investment analysis of the Kuzkaya Weir and HEPP project.

As is known, there are also benchmarks for other countries in the appendix of "Guidelines on the assessment of investment analysis, version 05" 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.

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

The internal rate of return (IRR) calculation is a convenient technique for Kuzkaya 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.

All the main parameters of project and other relevant financial items used in the equity IRR calculation is taken from the Feasibility Report of Kuzkaya Weir and HEPP and legal norms. Likewise, some items (corporate tax, tax deduction, tax exemption, etc.) are including for IRR calculation in line with the suggestion in "Tool for the demonstration and assessment of additionality".

Table 15: Main Parameters Used for Investments Analysis

Parameters	Unit	Data Value
Installed Capacity	MWe	6.518
Electricity Generated	MWh	19,899
VAT amount	USD	1,324,862.05
Investment Cost (VAT included)	USD	10,967,289.78

[58] 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)

Feed-in Tariff	USD/KWh	7.3
Expected VER price	€/ tCO2-eq	5
EURO/USD [59]	-	1.19

The main parameters and items were gathered at the table above which was used in IRR calculations.

(i) The cash outflow; investment cost, operational and maintenance cost and renewal cost

Costs can be classified into three categories in line with the referred Feasibility Study. These are investment costs, operational and maintenance cost and renewal cost. The State Hydraulic Works (DSI) annually publishes the estimated unit prices of construction of units to be used at the Feasibility Study Reports conducted in Turkey.

There are two types of costs calculated within the Feasibility Study. One is the cost based on DSİ (State Hydraulic Works) unit prices which calculation is obligatory by DSİ for conducting a Feasibility Study. The other one is calculated as 25% discounted. The unit prices of DSİ are reduced with a rate 25%. Hence the costs of relevant units are reduced. (The cost of land acquisition, energy transmission line and electromechanical equipment are not reduced since they are not estimated by using DSİ unit prices.)[60] In fact, they are estimated with respect to the surveys/studies and real cost at the market.

The investment cost with 25% reduction is preferred for IRR analysis of Kuzkaya Weir and HEPP project in a conservative manner.

The following table gives the cost of units,

Table 16: Kuzkaya Weir and HEPP Investment Costs (USD)

Project Units	Investment Cost Total (USD)
Roads (3km)	116,290.99
Construction site	54,107.34
Derivation	84,613.51
Kuzkaya 1-2 Weirs	1,047,979.68
Water intake structures and sedimentation basins	854,758.76
Transmission Channels (Ltotal=9430m)	3,369,073.68
Transmission Channels Engineering structures	168,453.43
Head ponds and penstock water intake structures	716,825.83
Penstocks	365,592.20
Power houses (6.518 MWe)	389,238.87
Electromechanical Equipment	1,568,775.71
Energy Transmission Line (34.5kV,9km)	317,624.98
Land Acquisition	589,101.73

[59] The exchange rate of eruo to TL on June 1,2010 was used for conversion to be in line with the submission date of the feasibility study to DSİ (State Hydraulic Works). The exchange rate was retrieved from Turkish Central Bank as an official and reliable source (http://www.tcmb.gov.tr/kurlar/201006/01062010.html). For USD to TL, the unit prices of DSİ (State Hydraulic Works) for the year 2010 was used retrieved from the Kuzkaya Weir and HEPP, Feasibility Study Report, section 8.1

[60] Kuzkaya Weir and HEPP, Feasibility Study Report, section 8.2

Investment Cost	**9,642,436.73**
VAT	1,324,862.05
Investment Cost + VAT	**10,967,298.78**

Source: *Kuzkaya Weir and HEPP, Feasibility Study Report, Table 8.6*
Note: Please follow the IRR calculations excel sheet for more details.

While it is not considered value add tax in the feasibility report, VAT was included into the investment costs to be more realistic and conservative. It is important to note that electromechanical equipment cost is exempt from VAT by-law[61]. The VAT ratio is 18% in according to the Value Added Tax Law (no: 3065, Official Gazette No 18563, dated 02/11/1984; put into force on 01/01/1985) and applied to investment cost of units.

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

Table 17: The Operation and Maintenance Cost (USD) of Kuzkaya Weir and HEPP

Units	Operation and Maintenance Cost (USD)
Roads (3km)	850
Construction site	395
Derivation	309
Kuzkaya 1-2 Weirs	7,993
Water intake structures and sedimentation basins	6,681
Transmission Channels (Ltotal=9430m)	53,106
Transmission Channels Engineering structures	1,328
Head ponds and penstock water intake structures	6,047
Penstocks	6,216
Power houses (6.518 Mwe)	3,259
Electromechanical Equipment	19,554
Energy Transmission Line (34.5kV,9km)	4,050
Land Acquisition	0
TOTAL	**109,788**

Source: *Kuzkaya Weir and HEPP, Feasibility Study Report, Table 8.6*
Note: Please follow the IRR calculations excel sheet for more details.

The renewal cost is given as below in the Feasibility Study Report;

Table 18: The Renewal Cost of Units (USD) of Kuzkaya Weir and HEPP

Units	Renewal Cost (USD)
Roads (3km)	2
Construction site	73
Derivation	2
Kuzkaya 1-2 Weirs	26

[61] Full exemption of delivery of machine and equipment referred in Investment Incentive Certificates (VAT Law no 3065, Article 13)

Water intake structures and sedimentation basins	22
Transmission Channels (Ltotal=9430m)	87
Transmission Channels Engineering structures	4
Head ponds and penstock water intake structures	20
Penstocks	253
Power houses (6.518 Mwe)	602
Electromechanical Equipment	5,394
Energy Transmission Line (34.5kV,9km)	439
Land Acquisition	0
TOTAL	**6,925**

Source: *Kuzkaya Weir and HEPP, Feasibility Study Report, Table 8.6*

Hence, the total annual expense is calculated as **116,713 USD** (109,788 USD + 6,925 USD).

(ii) The cash inflow

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 Law, the renewable energy producers can sell its electricity to TEİAŞ on an estimated price which is 7.3 USD/KWh.
1 USD = 1.60 TL[62] and 1 EURO = 1.92 TL[63] (exchange selling rate).

The annual electricity generation has been taken as 19,899 MWh.
Correspondingly; the annual income will be 1,452,627 USD. It is assumed constant selling price of electricity during the 44 years of operation.

(iii) Earnings before Interest, Depreciation (EBITD)

These gross earnings figures are stated in the excel sheet.

(iv) Depreciation

Depreciation related to the project, which has been deducted in estimating EBITD, added back to net profits in line with the suggestion in "Tool for the demonstration and assessment of additionality".

(v) Interest Expenses and Financial Structure

In this project finance, capital structure is 25% debt and 75 % capital. 2,806,180.76 USD is used as loan to finance this Project.

(vi) Deduction of Input VAT

[62] Defined value by State Hydraulic Works, retrieved from conducted Kuzkaya Weir and HEPP Feasibility Study Report, section 8.1
[63] The exchange rate on June 1,2010 was used for conversion to be in line with the submission date of the feasibility study to DSİ (State Hydraulic Works). The exchange rate was retrieved from Turkish Central Bank as an official and reliable source (http://www.tcmb.gov.tr/kurlar/201006/01062010.html). The measures in the feasibility study were used as the input data of IRR calculations.

Project participant has the right to deduct input VAT of investment cost. Paid input VAT in the investment period is deducted from tax of income in the following years.[64] VAT is 18% as per the VAT Law no: 3065.

(vii) Instalment Payment

Repayments of principal are stated in the excel sheet.

(viii) Net Cash Flow

Net Cash Flow = Net Earnings + Depreciation + Deduction (Netting) of Input VAT - Instalment payment

(ix) 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 Kuzkaya Weir and HEPP Project 14.09% 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 salvage 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 salvage 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 project owner.

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.

(x) Equity IRR, VER income and the Benchmark

As is mentioned above, Equity IRR has been calculated as 14.09% without considering the carbon revenue. When benchmark IRR is taken as 15%, the Project is not financially attractive. We consider 5 euro as VER Sales Unit Price (conservative prediction).
With the addition of the carbon revenues in the cash flows, the Equity IRR increases to 14.75%. The IRR even with VERs remains lower than the benchmark of 15%.
In conclusion, the Equity IRR is 14.09 % and turns to 14.75 % by the addition of VER revenues. Since the benchmark is accepted as 15 %, the calculated IRRs express the project is not attractive financially.[65]

[64] Please see the excel sheet of IRR analysis.
[65] Please follow the excel sheet of IRR analysis.

Sub-step 2d: Sensitivity Analysis

The sensitivity analysis assessed to shows whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions.

The parameters are applied as investment cost, operation and maintenance cost, electricity price and amount of electricity generated which are assessed below.

(i) Investment Cost;

The 10% increase and 10% decrease were applied to investment cost of Equity IRR analysis, respectively. With respect to the amount of decrease or increase in the costs, the loan amount should be decreased or increased with same ratio, which was demonstrated in the IRR excel sheet as well.

Furthermore, in accordance with the decrease or increase in the cost, the VAT amount was decreased or increased. Hence, the distribution of netting of VAT by years should be reconsidered to give the total VAT amount which was decreased or increased.

(ii) Operation and Maintenance Cost;

The 10% increase and 10% decrease were applied to operation and maintenance cost of Equity IRR analysis for all operational years of project, respectively.

(iii) Electricity Price and Amount of Electricity Generated;

The 10% increase and 10% decrease were applied to income flow of Equity IRR analysis, respectively. The income has two variables; amount of electricity generated and unit price of electricity.[66] 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.

In line with the variation of income, netting of VAT amount should be changed, since the amount of netting of VAT in year y was the 18% of revenue in year y. The consideration of variation in netting of VAT amount was applied to the IRR sensitivity analysis (when income increase or decrease 10%).

Table 19: The Results of Sensitivity Analysis to Equity IRR of Kuzkaya Weir and HEPP project

Sensitivity Analysis		
Parameter when	**increases 10%**	**decreases 10%**
Investment cost	12.14%	15.03%
Operation maintenance cost	13.26%	13.64%
Electricity price	15.06%	11.81%

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

Electricity generation	15.06%	11.81%
Sensitivity Analysis including VER		
Parameter when	**increases 10%**	**decreases 10%**
Investment cost	12.74%	15.77%
Operation maintenance cost	13.93%	14.31%
Electricity price	15.73%	12.48%
Electricity generation	15.80%	12.41%

It may be seen from the sensitivity analysis that the 46 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:

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 investing in the project is not the most attractive option considering the alternative investment opportunities. Therefore, Project can be considered as additional to the baseline scenario.

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 "Tool for the 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 existing common practice is discussed through the following sub-steps.

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

At the moment, 796 licenses for hydro power plants are issued by EMRA[67], the "Electricity Market Regulation Agency". 422 of the HEPPs are small-scale projects which have installed power in-between 1 MW and 15MW (included). 10 of these small scaled HEPPs are owned by EÜAŞ. The 297 of these 412 HEPPs are in construction stage.[68] The 91 of these 412 are operating. Recently, there are accumulated installed capacities of HEPPs those are under

[67] Retrieved from http://www2.epdk.org.tr/lisans/elektrik/lisansdatabase/verilentesistipi.asp
[68] Retrieved from http://www2.epdk.org.tr/lisans/elektrik/proje/yenilenebilir.xls

construction in Turkey. Based on the EMRA data, for small scale HEPPs, the operating ones are accounted less than 22 % of the total number of licensed small scale HEPPs in Turkey.

In the light of completion ratio of HEPPs, the below identifies that the condition of project development which was updated at September 2010 by EMRA and arranged in accordance with relevant factors;

Table 20: Number of HEPP Facilities Licensed to Private Production Companies and Completed Over a Certain Completion Ratio[69]

Status	Number of HEPP project
Small scale HEPP project licensed	412
Small scale HEPP licensed and on-going construction	297
Small scales operating	91
Licensed but not operating (under construction or do not start construction yet)	321
(80-100) % completion of projects	18
(60-80)% completion of the project	14
(40-60)% completion of project	22
(20-40)% completion of project	34
(0-20)% completion of project	151

The table above shows that, 32 of the HEPP projects were completed with a ratio higher than 60%, which means that only (32/321*100) 9.9% of the HEPPs under construction could achieve a higher completion ratio than 60%. Therefore, it results in that the electricity generation from HEPP business is not a common practice.

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.

[69] Retrieved from http://www2.epdk.org.tr/lisans/elektrik/proje/yenilenebilir.xls

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.

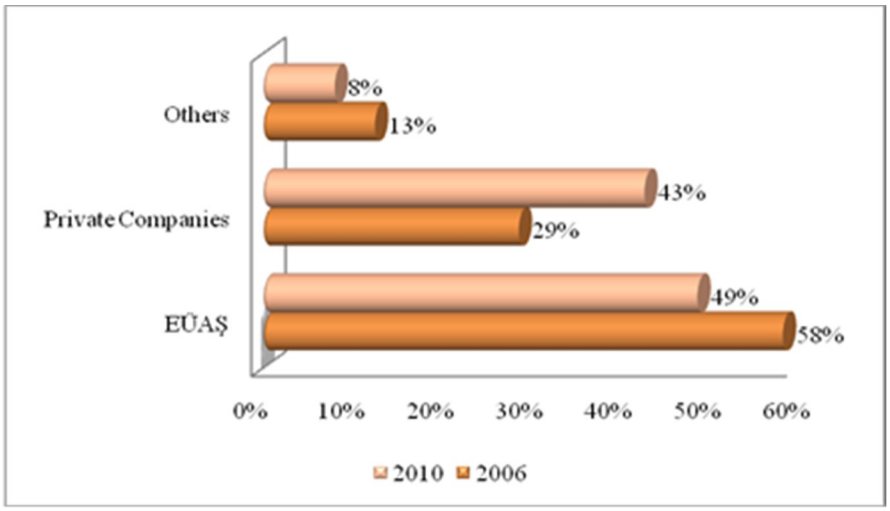

Figure 5: The share of installed capacities of Turkey by production utilities in the years 2006 and 2010[70]

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 21: 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) [71]

		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

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

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. [72] 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 6 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 7 below.

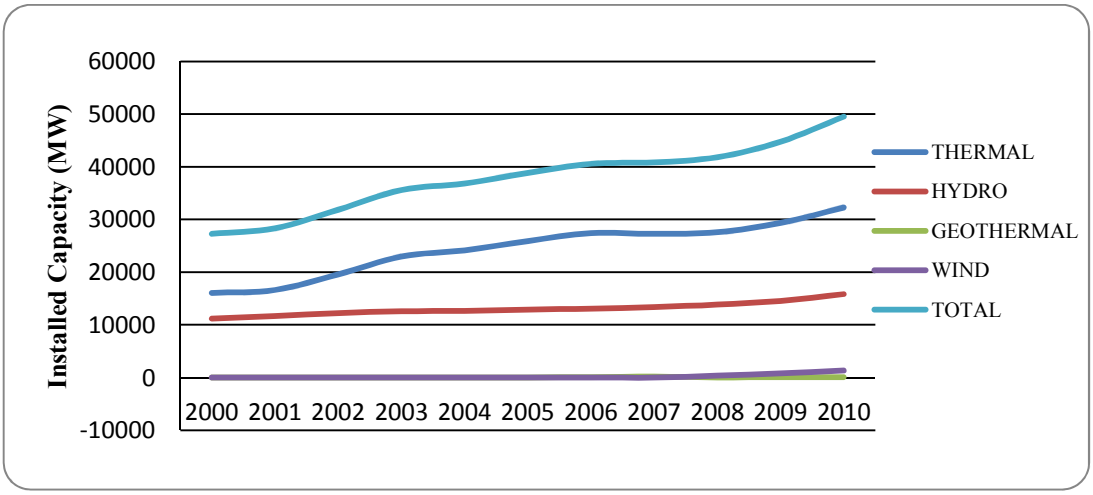

Figure 6: Annual development of Turkey's Installed Capacity[73]

[72] Retrieved from http://e-imo.imo.org.tr/Portal/Web/new/uploads/file/menu/HESRapor.pdf
[73] Retrieved from http://www.teias.gov.tr/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kguc(1-12)/3.xls

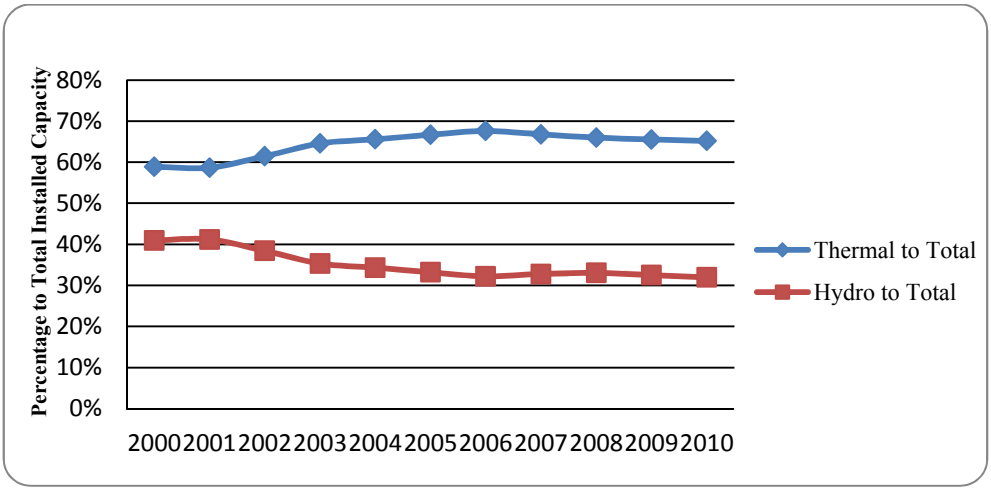

Figure 7: Percentage of annual development of Turkey's Thermal and Hydro Power Installed Capacity to Total Capacity [74]

In reference to "Tool for the demonstration and assessment of additionality, version 06.0.0"; *"Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. and the following discussion is on similar project activities."* The HEPPs was tabulated below with respect to owner, certain status, licensing date, installed capacities and completion rate in accordance with the "Tool for the demonstration and assessment of additionality, version 06.0.0".

The total number of small-scale projects located at Kastamonu Province is ten (please see Table 22 below). The Kuzkaya Weir and HEPP project is also included in this number. There are two HEPPs which were completed. The completion ratios of other current investments are very low owing to project/location specific barriers or unfavorable usage of investment funds by companies. The completed ones; Başak Weir and HEPP and Yavuz Weir and HEPP are listed under VER projects at Gold Standard official web page. The Berke, Kuzkaya and Zala Weir and HEPP projects are listed, as well.

Table 22: The small scale HEPP project already licensed at and near the Kastamonu Province

Name of the HEPP-Creek	Company Name	Status	Licensing date	Capacity (MWm)	Completion (%)
Başak Weir and HEPP - Kapısuyu	Nisan Enerji San. Tic. A.Ş.	Licensed - in operation	06/03/2008	7.285	**100**
Berke Weir and HEPP-Aydos	Eser En. Ür. A.Ş.	Licensed	02/04/2008	6.4	84.6
Yavuz Weir and HEPP-Küre	Arem En.Ür. A.Ş.	Licensed	08/05/2008	5.6	**100**
Kemal Weir and HEPP-Karaçay	Arısu Enerji San. Tic. Ltd. Şti.	Licensed	16/12/2008	7.6	3.5
Akkaya Weir and HEPP-Akkaya	MED En. A.ş.	Licensed	05/03/2009	4.6	2.9

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

Yunuslar I-II HEPP -Akçay	Hes En. Ür. San. Tic. A.Ş.	Licensed	09/06/2010	8.1	4.5
Demirci Weir and HEPP-Gökırmak	Demirci En. Yat. Ür. İnş. Tic. A.Ş.	Licensed	30/09/2010	13.1	7.8
Zala Weir and HEPP-Araç	Ahmet Hakan El. Ür. A.Ş.	Licensed	02/12/2010	5.8	5.6
Samatlar HEPP- Araç	Rak İnş. Tur. Demir San. Tic. Ltd. Şti.	Licensed	28/04/2011	6.0	-
Kuzkaya Weir HEPP-Araç	Murat Hakan El. Ür. A.Ş	Licensed	12/05/2011	6.7	-

**Condition in July 2011*

Thus, 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.[75] The low ratio of private companies in the power generation sector proves that HEPP project implementation by private companies 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 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.[76] [77] 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.

[75] Retrieved from http://e-imo.imo.org.tr/Portal/Web/new/uploads/file/menu/HESRapor.pdf
[76] Renewable Energy Project, WWF, 2011, http://www.wwf.org.tr/pdf/yenilenebilirenerjiproje.pdf
[77] Ela Uluatam, TOBB, *AB Proje Geliştirme ve İzleme Müdürlüğü,* http://www.tobb.org.tr/AvrupaBirligiDairesi/Dokumanlar/Raporlar/YenilenebilirEnerjiTesvikleri.pdf

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:

This project follows the methodology described in the AMS-I.D "Approved Small Scale Methodology for Grid Connected Renewable Electricity Generation, version 17".

Selected methodology has been applied together with the "Tool to calculate the emission factor for an electricity system, version 02.2.1" and "Tool for the demonstration and assessment of additionality, version 06.0.0".

According to AMS-I.D;

The *baseline scenario* is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

The *baseline emissions* are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y} \quad \textbf{(1)}$$

Where:

BE_y =Baseline Emissions in year y (t CO_2)

$EG_{BL,y}$ =Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{CO2,grid,y}$ =CO_2 emission factor of the grid in year y (t CO_2/MWh)

The emission factor can be calculated in a transparent and conservative manner as follows:

(a) 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";

In order to calculate the combined margin the following six steps shall be applied as per "Tool to calculate the emission factor for an electricity system, version 02.2.1".

Step1. Identify the relevant electricity systems;

Turkey the host country is not participating in the compliance market, hence although it has a focal point to UNFCCC it does not have a structured DNA, a description of the project electricity system and a connected electricity systems has not been published.

For such cases, the following criteria are suggested to be used as per tool to determine the existence of significant transmission constraints:

- 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% between the systems during 60% or more of the hours of the year;
- The transmission line is operated at 90% or more of its rated capacity during 90% or more of the hours of the year.

Since no spot electricity market is available in Turkey, as suggested in the first criterion; hence, this criterion is not viable.

Besides, there is no published data on capacity usage of transmission lines; the second criterion could not be proved.

As suggested in "Tool to calculate the emission factor for an electricity system, version 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). A provincial grid definition may indeed in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity. In other countries, the national (or other larger) grid definition should be used by default. "

However, there are no layered dispatch systems in the host country; Turkey. As a result the "Turkish national grid" was used as the "project electricity system". For the case of the proposed 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. [78] There is no independent or regional grid system in any region of Turkey.

Hence, the connected electricity system and project electricity system comprises of all power plants connected to the Interconnected Turkish National Grid.

The calculations of which procedures are given below; estimation of OM (Operating Margin) and BM (Built Margin) are made for the entire Turkish Grid.

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.

Tool states that; 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.

[78] Türkiye Elektrik Enerjisi 10 Yıllık Üretim Kapasite Projeksiyonu (2010-2019),/ 10-Year Forecast for Electricity Generation Capacity in Turkey (2010-2019), TEIAS, page 4 (http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf)

For the purpose of determining the operating margin emission factor, 0 t CO_{2-eq}/MWh is used as the CO_2 emission factor for net electricity imports (EF grid,import,y) from a connected electricity system since data used for calculating other options are not available.

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 (optional);

Tool suggests that choose one of 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 since the TEİAŞ –grid operator- data only covers grid connected power plants.

Step 3.Select a method to determine the operating margin (OM);

According to the applied Tool, the calculation of the operating margin emission factor (EFgrid,OM,y) is based on the following methods;

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

In case of the proposed project, 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. Hence, Simple OM method is applied.

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.

The following table shows the share of low-cost/must-run resourced electricity generation for the last 5 years of which data are available.

Table 23: Total Electricity Generation and From Low-Cost/Must Run Resources (2006-2010).[79]

Year	Thermal electricity generation	Low-cost/must-run electricity generation	Total gross electricity generation	Share of low-cost/must-run production to total
2006	131,681.1	44,618.70	176,299.80	25.31%
2007	154,982.5	36,575.63	191,558.13	19.09%
2008	163,919.4	34,498.60	198,418.00	17.39%

[79] Retrieved from Annual Development of Turkey's Gross Electricity Generation by Primary Energy Resources and The Electricity Utilities (2006-2010)

2009	156,583.3	38,229.60	194,812.93	19.62%
2010	155,370.1	55,837.60	211,207.70	26.44%
5-year average				**21.57%**

The low-cost/must run resources constitute less than 50% of total grid generation in average of the five most recent years, 21.57%. Therefore, the requirements for the use of the Simple OM calculations (option a) are satisfied.

The applied Tool suggests two data vintages; *Ex ante option* and *Ex post option* for calculation of OM emission factor. Due to the nature and availability of the data, for the calculation of Simple OM, the *Ex ante option is selected.* At the time of PD preparations in September, 2012, the data vintage used is most recent as 2008, 2009 and 2010. All the data used in calculation of Simple OM are provided from the "Electricity Generation & Transmission Statistics of Turkey[80]" published annually on the TEİAŞ website.

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

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;

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 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 since,

- Electricity generation and CO_2 emission factor of individual power plants/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 and
- Annual fuel consumption by fuel type, annual heating values for feuls consumed for electricity generation, annual electricity generation by fuel type, import and export data are available on the TEİAŞ web site.

At the time of PD preparations in September, 2012, the data vintage used is most recent as 2008, 2009 and 2010. All the data used in calculation of Simple OM are provided from the "Electricity Generation & Transmission Statistics of Turkey[81]" published annually on the TEİAŞ website.

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;

[80] http://www.teias.gov.tr/istatistikler.aspx
[81] http://www.teias.gov.tr/istatistikler.aspx

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$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}\right)}{EG_y} \quad \textbf{(2)}$$

Where:

EFgrid,OMsimple,y = Simple operating margin CO2 emission factor in year y (t CO2/MWh)

FCi,y = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

NCVi,y = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

EFCO2,i,y = CO2 emission factor of fossil fuel type i in year y (t CO2/GJ)

EGy = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)

i = All fossil fuel types combusted in power sources in the project electricity system in year y

y = the three most recent years as per data vintage chosen in step 3.

Step 5. Calculate the build margin (BM) emission factor;

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 based on the ex ante vintage data 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[82] 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 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 activities (SET5-units) shall be identified and annual electricity generation of (AEG set-5units, in MWh) 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≥20%) and their annual electricity generation (AEGSET≥20% in MWh)

c) From SET 5-units and SET≥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.

[82] VER-PDD for the proposed project

If none of the power units in SET sample started to supply electricity to the grid more than 10 years ago, then use SET sample to calculate the build margin.

The procedure was applied as; SET5-units and SET≥20% were determined; AEGset-5units, AEGSET≥20% and AEG total were calculated accordingly. AEGSET≥20% has larger annual electricity generation than AEGset-5units. Hence, SET≥20% is SET sample and none of the power units in SETsample started to supply electricity to the grid more than 10 years ago. Thereby, SETsample is used to calculate build margin.

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units *m* (SETsample) during the most recent year y for which power generation data is available, calculated as follows:

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

Where,

EFgrid,BM,y = Build margin CO2 emission factor in year y (t CO2/MWh)

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

EFEL,m,y = CO2 emission factor of power unit m in year y (t CO2/MWh)

m = Power units included in the build margin (power units of the SETsample)

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

The CO_2 emission factor of each power unit m (EFEL,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.

Considering the available data on the capacity additions, the formula given under Option A2 of Simple OM Option A is used to calculate EFEL,m,y.

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

Where:

EFEL,m, y = CO2 emission factor of the power unit m in year y (t CO2/MWh)

EFCO2,m,i,y = Average CO2 emission factor of fuel type i used in power unit m in year y (t CO2/GJ)

η m,y = Average net energy conversion efficiency of power unit m in year y (ratio)

m = All power units serving the grid in year y except low-cost/must-run power units

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

For this calculation, the generation efficiencies (η) are taken from the Annex 1 of the applied Tool. Average CO2 emission factor of different fuel types used in calculation are referred from 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

The CO2 emissions from the most recent capacity additions are calculated by multiplying the EFEL,m,y values determined for each fuel source by annual generation of that source (Table 28). The emission factor has been taken as zero for all renewable and wastes. The generation efficiency of power plants are designated by assuming as using combined cycle technology for oil and natural gas resourced plants and subcritical for coal types. The build margin emission factor for each year is calculated by dividing the total CO2 emissions of the subject year by the total generation from the capacity addition of the same year. The build margin emission factor of the grid is then calculated as a generation weighted average for the years, 2008-2010. Power units included in the build margin known as SETsample are the all power units added to the capacity between years 2008 and 2010 which is the SET≥20% mentioned above, as well.

Step 6.Calculate the combined margin (CM) emission factor.

Finally, the combined margin emission factor (EFgrid,CM,y) is expressed as the weighted average of the operating margin emission factor (EF grid, OM, y) and build margin emission factor (EF grid, BM, y). The equation is as follows;

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

Where:

EFgrid,CM,y = Combined margin CO2 emission factor in year y (tCO2/MWh)

EFgrid,OM,y = Operating margin CO2 emission factor in year y (tCO2/MWh)

EFgrid,BM,y = Build margin CO2 emission factor in year y (tCO2/MWh)

wOM = Weighting of the operating margin emission factor (%)

wBM = Weighting of the build margin emission factor (%)

Except wind and solar power generation project activities, wOM and wBM are by default 0.5 and 0.5 respectively for the first crediting period as specified by the Tool. Since the proposed project is hydropower project activity, EFgrid,CM for year y can easily be calculated by using above equation.

In line with above mentioned and applied procedure for Tool, the only parameter that is not monitored annually is the Combined Margin emission factor (EFgrid,CM,y) and will not be recalculated over the crediting period.

The equation of the baseline emission is taken from the approved methodology, AMS.I.D stated above as equation (1) and represented again below;

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y} \quad \textbf{(1)}$$

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.

For calculating $EG_{BL,y}$; based on the fact that the proposed project is a Greenfield energy power, 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).

$$EG_{PJ,y} = EG_{facility,y} \quad \textbf{(6)}$$

***Project Emission*:**

As applied methodology, AMS.I.D;

1. For most renewable energy project activities, PE_y = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the most recent version of ACM0002.[83]

   - Emissions from water reservoirs of hydro power plants.

The referred methodology ACM0002 states;

"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." and "the project emissions from water reservoirs of hydro power plants ($PE_{HP,y}$) estimated as follows";

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:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \quad \textbf{(7)}$$

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.

The PD has been calculated as 678.5 W/m^2 in section B.6.3. Hence, $PE_{HP,y}$= 0.

2. CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

No on-site consumption of fossil fuels due to project activity will be observed.

[83] ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

Leakage Emission;

According to the applied methodology, AMS.I.D; if the energy generating equipment is transferred from another activity, leakage is to be considered.

The transfer of energy generating equipment is not the subject of project activity. Thus, leakage is not considered.

Emission Reduction;

The ex ante emission reductions (ERy) are calculated as follows;

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(8)}$$

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)

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 Resources (1975-2010)
Value applied:	Table 23, Table 27
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the most recent and accurate information available.
Any comment:	

Data / Parameter:	**Electricity Imports**
Data unit:	GWh
Description:	Electricity transfers from connected electricity systems to the project electricity system by years (2008-2010)
Source of data used:	TEIAS (Turkish Electrical Transmission Company) Annual Development of Electricity Generation- Consumption and Losses in Turkey (1984-2010)
Value applied:	Table 23, Table 26
Justification of the choice of data or description of measurement methods	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the most recent and accurate information available.

and procedures actually applied :	
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 P.Ps In Turkey By The Electricity Utilities (2000-2005)
Value applied:	Table 24
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the most recent 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 P.Ps In Turkey By The Electricity Utilities ((2006-2010)
Value applied:	Table 25**Hata! Başvuru kaynağı bulunamadı.**
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the recent and accurate information available. Heat value is divided by FC to determine NCV. (The formula is retrieved 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:	TJ / tons (m^3 for gaseous fuels)
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data used:	Calculated by using heat value and FC
Value applied:	Table 24
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the recent and accurate information available. Heat value is divided by FC to determine NCV. (The formula is retrieved from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 1 of Volume 2,Box 1.1)

Any comment:	

Data / Parameter:	**$EF_{C02\ i,y}$** and **$EF_{C02\ m,i,y}$**
Data unit:	T CO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i,* used in power unit m, 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:	Calculated by Table 26 and used in Table 27
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:	**EFgrid,OMsimple,y**
Data unit:	tCO_2/MWh
Description:	Simple operating margin CO_2 emission factor in year y
Source of data used:	Calculated by formula (2)
Value applied:	0.657086
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data used in the formula is taken from the official source; TEIAS (Turkish Electricity Transmission Company).
Any comment:	

Data / Parameter:	**$EF_{EL,\ m,\ y}$**
Data unit:	tCO_2-eq/MWh
Description:	CO_2 emission factor of power unit *m* in year *y*
Source of data used:	Calculated by equation 4 by Table 28
Value applied:	Used in equation 3, Table 29
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:	**η 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, version 02.2.1, Annex 1 (after 2000)
Value applied:	Used in equation 4, Table 28
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since there are no current efficiency values of power units in Turkey, the efficiency values are retrieved from Tool to calculate the emission factor for an electricity system, version. 02.2.1, Annex 1.
Any comment:	

Data / Parameter:	**EGm,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) 10-Year Forecast for Electricity Generation Capacity in Turkey (2011-2020)" http://212.175.131.171/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf 10-Year Forecast for Electricity Generation Capacity in Turkey (2010-2019)" http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf 10-Year Forecast for Electricity Generation Capacity in Turkey (2009-2018) http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf
Value applied:	Table 29
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the recent and accurate information available. The electricity generation from all different sources included in capacity addition used in the equation 3.
Any comment:	EGm,y expresses capacity additions to the grid by power unit m in subject year. The summation of all years and units added to capacity in this year comprises 20% of the total generation (2008-2010). The summation of capacity additions between 2008 and 2010 are not sufficient to meet the %20 of total generation in 2010.

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 in Table 29
Value applied:	0.444260 and used in equation 5
Justification of the choice of data or description of measurement methods and procedures	Calculated *ex-ante* and comprised capacity addition of power plants between years 2008-2010 according to the "Tool to calculate emission factor for an electricity system, version 02.2.1"

actually applied :	
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 by equation 5
Value applied:	0.550673
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:	

B.6.3 Ex-ante calculation of emission reductions:

Simple Operating Margin (OM)

As mentioned above, the most recent data vintage belongs to the years 2008, 2009 and 2010. All the data used in calculation of the simple OM are referred to the "Electricity Generation & Transmission Statistics of Turkey[84]" published annually on the TEİAŞ website. The *emission reduction spread sheet* submitted to DOE and recommended to be followed since the mentioned references/sources were given as sheets and calculations would easily be followed in line with the tool.

Taking into account the available data, option B for simple OM method is appropriate for the project activity. TEİAŞ publishes the annual heating values of the fuels consumed in the power plants, the heating values are directly related to fuel consumption and are used to calculate average Net Calorific Values (TJ/kt).

The heating values were published by TEİAŞ with the unit Tcal. Tcal is converted to Gjoule by using the conversion factor 1Joule = 0.239 calories. Then the heating values in GJ are divided by Fuel Consumption (FCi,y) to determine the Net Calorific Values of the fuels consumed in TJ/kt as follows;

Table 24: Heat Values, FC and NCV values of each fuel source in 2010, 2009 and 2008

Year	Fuel Type	FC (tones)	Heat Value (TJ)	NCV (TJ/tones)
2010	Sub-Bituminous Coal	7,419,703	165,462.568	0.022
	Lignite	56,689,392	403,969.424	0.007
	Fuel-Oil	891,782	35,853.233	0.040
	Diesel-Oil	20,354	876.473	0.043
	LPG	0	0.000	0.000
	Naphtha	13,140	439.860	0.033

[84] http://www.teias.gov.tr/istatistikler.aspx

	Natural Gas	21,783,414	813,734.798	0.037
2009	Sub-Bituminous Coal	6,621,177	146,982.896	0.022
	Lignite	63,620,518	408,574.172	0.006
	Fuel-Oil	1,594,321	63,429.040	0.040
	Diesel-Oil	180,857	7,657.667	0.042
	LPG	111	5.155	0.046
	Naphtha	8,077	352.289	0.044
	Natural Gas	20,978,040	779,336.254	0.037
2008	Sub-Bituminous Coal	6,270,008	139,369.061	0.022
	Lignite	66,374,120	452,821.836	0.007
	Fuel-Oil	2,173,371	86,219.701	0.040
	Diesel-Oil	131,206	5,556.353	0.042
	LPG	0	0.000	0.000
	Naphtha	10,606	472.792	0.045
	Natural Gas	21,607,635	791,014.608	0.037

The CO_2 emission factors of fossil fuel types were retrieved from IPCC guidelines as suggested by Tool and tabulated below.

Table 25: CO_2 emission factors of fossil fuel types[85]

Fuel Type	EF CO_2 (kg/TJ) -lower-
Sub-Bituminous Coal	92,800
Lignite	90,900
Fuel-Oil	75,500
Diesel-Oil	72,600
LPG	61,600
Naphtha	69,300
Natural Gas	54,300

Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants, including imports in year y, (EGy) have been determined by the following way;

Table 26: Calculation of EGy for 2008, 2009 and 2010

	Net generation	Internal consumption (%)	Generation of low cost/must run	Internal consumption of low cost/ must run	Net generation of low cost/must run	Net total generation-net generation low cost must run	Imports	**EGy** (GWh)
2008	189,761.90	4.36	34,498.60	1,505.02	32,993.58	156,768.32	789.40	157,557.72
2009	186,619.30	4.21	38,229.60	1,607.89	36,621.71	149,997.59	812.00	150,809.59
2010	203,046.10	3.86	55,837.60	2,157.71	53,679.89	149,366.21	1,143.80	150,510.01

[85] CO2 emission factors for combustion: IPCC guidelines vol.2 chp. 1, Annex 1 for sub-bituminous and Table 1.4 for others

The net electricity generation by all primary energy resources, internal consumption rate, imports and gross electricity generation by low-cost/must run resources are published by TEİAŞ. In order to determine the net electricity generation by low-cost/must-run resources, the internal consumption of low-cost/must-run power plants have been subtracted from the gross electricity generation of those and the internal consumption can be calculated by the internal consumption percentage have been multiplied with gross electricity generation of low-cost/must run resources. Then, the net electricity generation of low-cost/must–run resources have been subtracted from net electricity generation by all primary resources in line with applied Tool. Finally by the addition of imports, the EGy was determined.

The OM emission factors for each fuel type for each year; 2008, 2009 and 2010 were calculated. The OM emission factors in the same year for different fuel types are summed up and given below. The electricity generation weighted average of those gave;

Table 27: Generated Electricity Weighted Average EFgrid,OMsimple,y (t CO_2 / MWh)

	2008	**2009**	**2010**
	EF grid,OMsimple,y,i (t CO2 / MWh)		
Sub-Bituminous Coal	0.08209	0.09045	0.10202
Lignite	0.26125	0.24627	0.24398
Fuel Oil	0.04132	0.03175	0.01798
Diesel Oil	0.00256	0.00369	0.00042
LPG	0.00000	0.00000	0.00000
Naphtha	0.00021	0.00016	0.00020
Natural Gas	0.27261	0.28061	0.29357
Total	0.66003	0.65292	0.65818
3-year electricity generation weighted average (tCO2/MWh)	**0.657086**		

EFgrid,OM = 0.657086 t CO2/ MWh

Build Margin (BM)

According to the tool, in terms of the ex ante data vintage, option 1 was conducted. For the first crediting period, the EFgrid,BM was calculated ex ante based on the most recent data available on the plants designated as sample set at the time of PDD preparation and ER calculation. For the second crediting period, the build margin emission factor will be updated based on the most recent data available on plants added to capacity at the time of submission of the request for renewal of the crediting period to DOE.

The sample group of power units *m* used to calculate the build margin was determined as the capacity addition of years 2010, 2009 and 2008 to grid. This set is named as SETsample and equal to SET≥20% in accordance with the procedures detailed in section 3.1. For all computation in this part, the CDM registered activities were excluded from the capacity addition.

Electricity generation of the power plant in SET≥20% shall comprise 20% of AEGtotal of the referred year. The referred year was selected as 2010 of which data have been recently available when the PD was prepared (September, 2012).

The required capacity addition data can only be found in the report named as "10-Year Forecast for Electricity Generation Capacity in Turkey" and published by TEİAŞ. The power plants added to capacity of Turkey are published on an annual basis. The date of starting operation, installed capacity and electricity generation of power plants added to capacity in year 2010 was published at the report; "10-Year Forecast for Electricity Generation Capacity in Turkey (2011-2020)"[86]. The same data for year 2009 was at the report; "10-Year Forecast for Electricity Generation Capacity in Turkey (2010-2019)", and so on. The details of references for capacity addition data can be found in the "emission reduction spread sheet" submitted to DOE.

Hence;

AEGtotal,2010 = 207,587 GWh

20% of AEGtotal,2010 = 41,517.40 GWh

AEGSET≥20% = 41,813.09 GWh (comprise 20% of AEGtotal,2010)

AEGSET≥20% expresses the summation of EGm,y: electricity generated and delivered to grid by power unit m in year where m: all power plant in SET≥20% and y for each year; 2008, 2009 and 2010.

The calculation of EFEL,m,y is shown in the table below;

Table 28: Calculation of EFEL using default generation efficiencies

Fuel Type	EF CO2 (kgCO2/Tj)	EF CO2 (tCO2/Gj)	Generation Efficiency* (%)	EF,EL,my (tCO2/MWh)
Sub-Bituminous Coal	92,800	0.0928	0.39	0.8566
Lignite	90,900	0.0909	0.39	0.8391
Fuel Oil	75,500	0.0755	0.46	0.5909
Diesel Oil	72,600	0.0726	0.46	0.5682
LPG	61,600	0.0616	0.46	0.4821
Naphtha	69,300	0.0693	0.46	0.5423
Natural Gas	54,300	0.0543	0.60	0.3258

In the following table, the capacity addition of a fuel source for all subject years was summed up to determine the total capacity addition of that fuel source. The CO_2 emissions from the most recent capacity addition are calculated by multiplying the EFELm,y values calculated for each fuel source at the table above by annual electricity generation (capacity addition) of that fuel source.

[86] http://212.175.131.171/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf

$EFCO_2$ of renewable resources (wind, geothermal, hydro, renewable+waste) are taken as zero as detailed in section B.6.1. Thus, in the table below, the amounts of emissions by renewable resources were zero.

Table 29: Annual CO_2 emissions for capacity additions by fuel sources

Year	2008	2009	2010	Capacity addition	Emission by fuel source
Fuel Type	**Electricity generation (GWh)**			**Total**	**Total**
Sub-Bituminous Coal	0.00	1,923.33	9,080.00	11,003.33	9,425.62
Lignite	0.00	948.00	0.00	948.00	795.44
Fuel-oil	16.40	777.79	0.00	794.19	469.26
Diesel Oil	0.00	0.00	0.00	0.00	0.00
LPG	0.00	0.00	0.00	0.00	0.00
Naphtha	0.00	0.00	0.00	0.00	0.00
Natural Gas	1,960.60	10,089.16	12,153.90	24,203.66	7,885.55
Wind	25.71	337.33	308.06	671.10	0.00
Geothermal	14.10	0.00	0.00	14.10	0.00
Hydro	255.43	1,107.00	2,538.24	3,900.67	0.00
Renewable+Waste	0.00	144.95	133.08	278.04	0.00
Total	2,272.24	15,327.56	24,213.29		**18,575.88**
$AEG_{SET\geq20\%}$	**41,813.09**				

The build margin emission factor of the grid is then calculated as a generated weighted average by dividing the total emission of fuel sources by electricity generated by SET≥20% (AEGSET≥20%).

EFgrid,BM = 18,575.88 / 41,813.09 = **0.444260 t CO2/ MWh**

Combined Margin (CM)

Where weights w_{OM} and w_{BM} are by default 0.5 as per applied methodology, based on the formula no.4 in section 3.1;

EFgrid,CM,y = (0.5 x 0.657086) + (0.5 x 0.444260) = **0.550673 t CO_{2-eq}/ MWh**

Baseline Emission

BEy = 0.550673 t CO_{2-eq}/ MWh x 19,899 MWh = **10,957 t CO_{2-eq}**

Project Emission

According to referred methodology ACM0002;

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

Cap $_{PJ}$ = 6,518,000 W_e

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

A Kuzkaya 1 weir ponding area = 10,000 m^2

A Kuzkaya 2 weir ponding area = 15,000 m^2

A_{Pj} = 25,000 m^2 (area may cause CH_4 emission)[87]

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

Therefore;

PD = (6,518,000 – 0) / (0 – 25,000) = 260.72 W / m^2 > 10 W / m^2

Hence; **PEy = 0 t CO2-eq**

Leakage Emission

LEy = 0 t CO2-eq in accordance with applied methodology; AMS.I.D.

Emission Reduction

ERy = 10,957 t CO2-eq – 0 – 0 **= 10,957 t CO2-eq**

B.6.4 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)
May-December 2015*	0	7,305	0	7,305
2016	0	10,958	0	10,958
2017	0	10,958	0	10,958
2018	0	10,958	0	10,958
2019	0	10,958	0	10,958
2020	0	10,958	0	10,958
2021	0	10,958	0	10,958
January-April 2022**	0	3,653	0	3,653
TOTAL for 7 yrs.	**0**	**76,705**	**0**	**76,705**

** For 8 months*
*** For 4 months*

[87] Kuzkaya Weir and HEPP, EIA Report, page 29

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**EGy, Kuzkaya Weir and HEPP**
Data unit:	MWh
Description:	Net Electricity generated and delivered to the grid by the proposed 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	19,899 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.
Frequency:	Annually
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. The cross-check will be provided by TEİAŞ-PMUM invoices.
Any comment:	

Data / Parameter:	**Qmin Kuzkaya 1**
Data unit:	m^3/s
Description:	The minimum flow released to the downstream of creek after weir structure also known as minimum flow which is ecological water demand of creek.
Source of data to be used:	Will be measured via flow meter.
Value of data:	

Months	**Released from Kuzkaya 1 weir**
January	450 l/sec
February	1250 l/sec
March	1250 l/sec
April	1250 l/sec
May	1266.88 l/sec
June	1283.76 l/sec
July	All coming flow
August	All coming flow
September	473.21 l/sec
October	450 l/sec
November	450 l/sec
December	450 l/sec

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.
Frequency:	Annually
QA/QC procedures to be applied:	The minimum flow is controlled by General Hydraulic State Works The 23rd Regional Directorate and Kastamonu Provincial Directorate of Environment and Urban Planning by means of flow meter.
Any comment:	

Data / Parameter:	**Qmin Kuzkaya 2**
Data unit:	m^3/s
Description:	The minimum flow released to the downstream of creek after weir structure also known as minimum flow which is ecological water demand of creek.
Source of data to be used:	Will be measured via flow meter.
Value of data:	

Months	Released from Kuzkaya 2 weir
January	260 l/sec
February	260 l/sec
March	260 l/sec
April	260 l/sec
May	265.72 l/sec
June	267.7 l/sec
July	All coming flow
August	All coming flow
September	261.76 l/sec
October	260 l/sec
November	260 l/sec
December	260 l/sec

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.
Frequency:	Annually
QA/QC procedures to be applied:	The minimum flow is controlled by General Hydraulic State Works The 23rd Regional Directorate and Kastamonu Provincial Directorate of Environment and Urban Planning by means of flow meter.
Any comment:	

Data / Parameter:	**Air quality**
Data unit:	tSO_2 and tNOx
Description:	The avoided SO2 and NOx/KWh by project activity which substitutes

	electricity generation from thermal power plants.
Source of data to be used:	The impact of hydro power to air quality will be monitored by calculating avoided NOx and SO_2 emissions from electricity mix of Turkey in the year calculation.
Description of measurement methods and procedures to be applied:	The official data will be chosen.
Frequency:	Annually
QA/QC procedures to be applied:	The share of electricity generation from coal and fuel oil will be taken from official statistics, as well as the total emission amounts for NOx and SO_2 by electricity production. (referred from TUİK)
Any comment:	

Data / Parameter:	**Employment (Job quality)**
Data unit:	-
Description:	The job quality can be improved by providing relevant trainings to employees during both construction and operation phases.
Source of data:	Training certificates of employees
Description of measurement methods and procedures to be applied:	The employees should be trained on first aid, health and safety issues and. There is also technical training on the operation of the equipment. The trainees receive a certificate to participants after those trainings. Hence, the participation of employees to those training can be monitored by means of certificates provided.
Frequency:	Annually
QA/QC procedures to be applied:	The trainees receive a certificate after the trainings provided by project owner.
Any comment:	

Data / Parameter:	**Employment (Job quantity)**
Data unit:	-
Description:	The project activity will create a substantial number of jobs.
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 to the Social Security Institution of Turkey (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. 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.
Frequency:	Annually
QA/QC procedures to be applied:	All employees in all sectors shall be registered to SSI portal with respect to Turkish laws.
Any comment:	

Data / Parameter:	**Livelihood of the poor**

Data unit:	-
Description:	The employment of local people within the proposed project 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:	The social security institution records of recruited stuff
Description of measurement methods and procedures to be applied:	The number of locally recruited stuff
Frequency:	Annually
QA/QC procedures to be applied:	All employees in all kinds of sectors shall be registered to SSI portal with respect to Turkish laws.
Any comment:	

Data / Parameter:	**Human and institutional capacity**
Data unit:	-
Description:	The local people who will be employed within the proposed project will be trained on for instance; workers health and safety issues. Hence, the skills of plant staff, as the local people will be developed which results in an improvement of human capacity.
Source of data:	The number 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 crediting period
Frequency:	Annually
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)**
Data unit:	-
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. The data will obtained from annual TEAİŞ statistics.
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.
Frequency:	Annually
QA/QC procedures to	The share of electricity generation from natural gas and liquid petroleum

be applied:	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.
Frequency:	Annually
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 Energy Environmental Investments and Consultancy Limited Company 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." [88] 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[89] or upon request by either project owner or TEIAS[90]. 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[91] 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[92]. 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 after the end of last crediting period 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.

The institutional arrangement of plant staff during operation of plant is planned to employ 3 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.

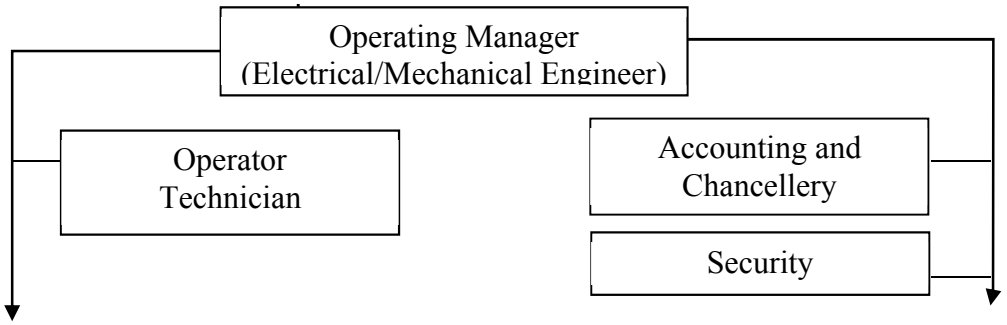

Figure 8: Institutional Arrangement of Plant Staff during Operation

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

[88] Retrieved from http://www.mevzuat.adalet.gov.tr/html/21179.html
[89] Retrieved from http://www.teias.gov.tr/mali/GDUY/PRO_FORM/OLCUM/DAG02.xls
[90] Retrieved from http://www.epdk.gov.tr/english/regulations/electric/balancing/balancing.doc
[91] Please see http://pmum.teias.gov.tr
[92] Retrieved from http://www.teias.gov.tr/mali/GDUY/PRO_FORM/OLCUM/K01.xls

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 equipment. All staff will be trained and will have certificate for working with high voltage equipment.

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 Kuzkaya 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 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. The parameter of balance of payments is calculation of avoided natural gas import amount for electricity production. The 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. The parameter of human & institutional capacity and job quality is number of acquired certificates of trained personnel (training certificates). The parameter of livelihood of the poor is the number of locally recruited stuff.

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: 23/09/2011

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

Address: Mahatma Gandi Caddesi, No: 92/2-3-4-6-7 06680 G.O.P – Ankara/ TURKEY
Tel: +90 312 447 26 22
Fax: +90 312 446 38 10
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:

01/05/2013 –expected-

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

Starting from the date, 12/05/2011, 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 11 days,*** considering that the starting date of operation is 01/05/2015.

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. Besides, the remaining lifetime (RL) of the equipment is the time for which the existing equipment can continue to operate before it has to be replaced/discarded for technical reasons, such as the age of the equipment, safety reasons, or deteriorated performance.

The remaining lifetime is expressed in years or hours of operation. The remaining lifetime of electromechanical equipment is assessed since it has the shortest technical lifetime compared to other units of project activity. Since the proposed project is a greenfield plant, the technical lifetime of the equipment is equal to the remaining lifetime of the subject equipment.

Option (b) of "Tool to determine the remaining lifetime of the equipment" was chosen to determine the remaining life time of the electro mechanical equipment for the proposed project. For the electromechanical equipment, the technical life time is designated as 35 years with respect to the expert's suggestion based on his experiences on current operation and maintenance practices of electromechanical equipment. The expert opinion provides a basis for the renewal period of the electro mechanical equipment in the conducted Kuzkaya Weir and HEPP Feasibility Study Report and stated in section 9.1.4 of the mentioned Feasibility Study Report.

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:

01/05/2015

C.2.1.2.	Length of the first crediting period:

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 will enhance the air quality and help to reduce the adverse effects on the climate. Renewable technologies and hydro power based electricity 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 "EIA Positive Certificate".

In Turkey it is mandatory to assess projects and 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. This assessment called EIA (Environmental Impact assessment). The EIA Report for Kuzkaya Weir and HEPP project was prepared as per the national EIA Regulations-EIA Required Projects, Article 7-1-b. This assessment interprets the impacts of the HEPP project to project site and environment in detail. The EIA Report was submitted to the Ministry of Environment and Forestry (MoEF) in order to be evaluated by the relevant local governmental authorities and MoEF itself. After evaluation of the project and comments of the local authorities, the Ministry of Environment and Forestry has concluded that the project does not have significant environmental effects and the EIA assessment is considered as positive for the project activities. Here at, the EIA Report of Kuzkaya Weir and HEPP was approved by MOEF on 25/03/2011.

For detailed information regarding the environmental impacts of the project activity please see section A.4.2 and GS Passport for SDM and relevant mitigation measures.

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 due to the mitigation measures to be implied during both construction and operation phases.

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 Energy Environmental Investments Consultancy L.C. 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 "Kastamonu Sözcü" on 23/07/2010.

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 Kuzkaya Weir and Hydroelectric Power Plant Project that is planned to be constructed in Province of Kastamonu, Araç 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.

Location: İğdir Merkez Village, İğdir Primary School, Araç/Kastamonu
Date: 28.07.2010
Time: 11.00
Consultant: EN-ÇEV Energy Environmental Investments Consultancy L. C.
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: Murat Kaan Electricity Production Inc.

The Local Stakeholder Consultation meeting was realized on 28/07/2010 with the attendance of 16 local residents. 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:

In the Local Stakeholder Consultation Meeting, the stakeholders are pleasant about the project. The briefing was found affirmative and informative. Since they have informed regarding the

project at the first stakeholder consultation process they have no negative comments on the project.

It is observed that all people support the project especially accordingly the certain employment opportunities and possible economic development of the distinct. Four important issues for stakeholders are stated below.

In the referred meeting;

- 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 types 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.

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 raised any concerns, any 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:	Murat Kaan Elektrik Üretim A.Ş.
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Building:	No.5/2
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State/Region:	
Postfix/ZIP:	
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E-Mail:	info@usragroup.com
URL:	
Represented by:	İbrahim USTAOĞLU
Title:	
Salutation:	
Last Name:	USTAOĞLU
Middle Name:	-
First Name:	İbrahim
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

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 23.09.2011
Project reference Kuzkaya HEPP (6,51 MW) Kastamonu , GS 1002
To: Gold Standard Foundation

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

[*Project Owner*] Murat Kaan Elek. 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
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 Alioğlu
Title: Civil Engineer - Company Coordinator
On behalf of: İbrahim Usta

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Gold Standard Annexes to Toolkit Version 2.1 effective 1 July 2009 – use together with Versions 2.1 of the Gold Standard Requirements and Toolkit
Developed by Ecofys, TÜV-SÜD and FIELD

Annex 3

BASELINE INFORMATION

Table 30: Power plants added to capacity in year 2010

	Power plants added to capacity in year 2010	Installed capacity (MW)	Grid connected generator /Autoproducer	Fuel type	Commissioning date	Electricity generation (GWh)
Thermal	ETİ SODA ÜRE.PAZ.NAK.VE ELK.ÜRE.SAN.	24.000	auto	lignite	22.01.2010	
	CAN TEKSTİL (Çorlu/TEKİRDAĞ)	7.832	auto	N.gas	28.01.2010	
	ALTINMARKA	4.600	auto	N. gas	28.01.2010	
	CEV ENERJİ ÜRETİM (GAZİANTEP ÇÖP BİOGAZI)	1.131	grid connected	biogas	01.02.2010	8.6
	AKBAŞLAR (İlave)	1.540	auto	N. gas	18.02.2010	
	ORTADOĞU ENERJİ (ODA YERİ) (Eyüp/İST.)	4.245	grid connected	landfill gas	24.02.2010	33.357
	GLOBAL ENERJİ (PELİTLİK)	3.544	grid connected	n. Gas	26.02.2010	27.056
	KONYA ŞEKER SAN. VE TİC. A.Ş.	6.000	auto	Lingite	26.02.2010	
	FLOKSER Tekstil (Çatalça-İstanbul)(Süetser tesisi)	-2.128	auto	N. gas	28.02.2010	
	RASA ENERJİ (VAN)	26.190	grid connected	n. Gas	03.03.2010	166.622
	AKSA ENERJİ (ANTALYA)	25.000	grid connected	n. Gas	20.03.2010	192.5
	FRİTOLAY GIDA SAN.VE TİC A.Ş.	0.065	auto	BİOGAZ	21.04.2010	
	YILDIZ ENTEGRE AĞAÇ (Kocaeli)	12.368	auto	DOĞALGAZ	22.04.2010	
	ITC-KA ENERJİ (SİNCAN)	1.416	grid connected	landfill gas	30.04.2010	11.125
	ATAER ENERJİ ELEKTRİK ÜRETİM A.Ş.	49.000	grid connected	liquid+n. Gas	05.05.2010	277.885
	CENGİZ ENERJİ SAN. VE TİC. A.Ş. (Tekkeköy)	101.950	grid connected	n. Gas	22.05.2010	802
	SİMKO(Kartal)	-2.054	auto	DOĞALGAZ	27.05.2010	
	UĞUR ENERJİ ÜRETİM TİC. VE SAN. A.Ş.	48.200	grid connected	n. Gas	21.06.2010	405.136
	SÖKTAŞ (N+LPG)(Aydın)	-4.500	auto	NAFTA	23.06.2010	
	AKSA ENERJİ (ANTALYA)	25.000	grid connected	n. Gas	01.07.2010	192.5
	ALTEK ALARKO ELEKTRİK SANTRALLARI	60.100	grid connected	n. Gas	10.07.2010	415.569
	EREN ENERJİ ELEKTRİK ÜRETİM A.Ş.	160.000	grid connected	imported coal	15.07.2010	1068.235
	FLOKSER TEKSTİL (Çerkezköy/TEKİRDAĞ)	5.172	auto	DOĞALGAZ	17.07.2010	
	RB KARESİ İTHALAT İHRACAT TEKSTİL	8.600	auto	DOĞALGAZ	23.07.2010	
	CENGİZ ENERJİ SAN. VE TİC. A.Ş. (Tekkeköy)	101.950	grid connected	n. gas	31.07.2010	802
	KESKİNOĞLU TAVUKÇULUK VE DAM. İŞL.	3.495	auto	DOĞALGAZ	11.08.2010	
	BİNATOM ELEKTRİK ÜRETİM A.Ş.	2.000	grid connected	n. gas	17.08.2010	13
	CAN ENERJİ ELEKTRİK ÜR. A.Ş.(Tekirdağ)	29.100	grid connected	n. gas	19.08.2010	169.017
	KURTOĞLU BAKIR KURŞUN SAN. A.Ş.	1.585	auto	DOĞALGAZ	19.08.2010	
	SÖNMEZ ENERJİ ÜRETİM (UŞAK)	33.242	grid connected	n. gas	26.08.2010	256.297
	ITC ADANA BİOKÜTLE SANT.	11.320	grid connected	landfill gas	02.09.2010	80
	KIRKA BORAKS(Kırka) (Eti Maden İşl.) (İlave)	10.000	auto	SIVI+D.GAZ	29.09.2010	
	ENERJİ-SA (BANDIRMA)	1000.000	grid connected	n. gas	07.10.2010	7540
	UĞUR ENERJİ ÜR. TİC.VE SAN. A.Ş. (İlave)	12.000	grid connected	n. gas	07.10.2010	100.864
	ENERJİ-SA (BANDIRMA) (Düzeltme)	-69.200	grid connected	n. gas	25.10.2010	correction
	ITC ADANA BİOKÜTLE SANT. (Düzeltme)	-1.415	grid connected	landfill gas	25.10.2010	correction
	EREN ENERJİ ELEKTRİK ÜR. A.Ş. (İlave)	600.000	grid connected	imported coal	01.11.2010	4005.882
	MARMARA PAMUKLU MENSUCAT (İlave)	26.190	auto	DOĞALGAZ	25.11.2010	
	ALİAĞA ÇAKMAKTEPE ENERJİ (İlave)	69.840	grid connected	n. gas	26.11.2010	557.919
	FRİTOLAY GIDA SAN.VE TİC A.Ş. (İlave)	0.330	auto	BİOGAZ	26.11.2010	
	SÖNMEZ ENERJİ ÜRETİM (UŞAK) (İlave)	2.564	grid connected	n. gas	07.12.2010	19.768
	AK-ENERJİ (UŞAK OSB)(Uşak-Ak.en.)	-15.240	grid connected	liquid+n. Gas	09.12.2010	closed
	AK-ENERJİ(DG+N) (Deba-Denizli)	-15.600	grid connected	liquid+n. Gas	09.12.2010	closed
	TÜPRAŞ RAFİNERİ (İZMİT) (İlave)	40.000	auto	SIVI+D.GAZ	15.12.2010	
	POLYPLEX EUROPA POLYESTER FİLM	7.808	auto	DOĞALGAZ	16.12.2010	
	ALTEK ALARKO ELEKTRİK SANTRALLARI	21.890	grid connected	n. gas	18.12.2010	151.361
	AKSA ENERJİ (Demirtaş/BURSA)	-1.400	grid connected	renewable+waste	21.12.2010	closed
	RASA ENERJİ (VAN) (İlave)	10.124	grid connected	n. gas	29.12.2010	64.409
	EREN ENERJİ ELEKTRİK ÜR. A.Ş. (İlave)	600.000	grid connected	imported coal	29.12.2010	4005.882
	SİLOPİ ELEKTRİK ÜR. A.Ş. (ESENBOĞA)	-44.784	grid connected	FUEL-OİL	31.12.2010	closed
	YALOVA ELYAF	-12.300	auto	DOĞALGAZ	31.12.2010	
	AK TEKSTİL-1 (G.antep)	-13.040	auto	FUEL-OİL	31.12.2010	
	TÜPRAŞ RAFİNERİ (İZMİT) (Düzeltme)	-39.140	auto	SIVI+D.GAZ	31.12.2010	

	INTERNATIONAL HOSPITAL İSTANBUL AŞ.	0.770	auto	DOĞALGAZ	31.12.2010	
					Thermal total	**21366.984**
Geothermal	TUZLA JEOTERMAL	7.500	grid connected	geothermal	13.01.2010	55
	MENDERES GEOTERMAL DORA-2	9.500	grid connected	geothermal	26.03.2010	73
					Geoth. total	**128**
Hydro	SELİMOĞLU REG. VE HES	8.800	grid connected	run-off	07.01.2010	35
	KULP IV HES (YILDIZLAR EN.ELK.ÜR.AŞ.)	12.298	grid connected	run-off	13.01.2010	41
	CİNDERE HES (İlave)	9.065	grid connected	dam	21.01.2010	28.2
	BAYBURT HES (BAYBURT ENERJİ ÜRET.)	14.631	grid connected	run-off	28.01.2010	51
	UZUNÇAYIR HES (Tunceli) (İlave)	27.330	grid connected	dam	28.01.2010	107.32
	ALAKIR HES (YURT ENERJİ ÜRETİM)	2.060	grid connected	run-off	29.01.2010	6
	PETA MÜHENDİSLİK EN. (MURSAL II HES)	4.500	grid connected	run-off	19.02.2010	19
	ASA ENERJİ (KALE REG.ve HES)	9.570	grid connected	run-off	19.02.2010	32
	HETAŞ HACISALİHOĞLU (YILDIZLI HES)	1.200	grid connected	run-off	23.02.2010	5
	DOĞUBAY ELEKTRİK (SARIMEHMET HES)	3.100	grid connected	run-off	11.03.2010	10
	NURYOL ENERJİ (DEFNE REG. VE HES)	7.230	grid connected	run-off	26.03.2010	22
	ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	5.913	grid connected	run-off	01.04.2010	21.547
	BİRİM HİDR. ÜRETİM AŞ. (ERFELEK HES)	3.225	grid connected	run-off	03.04.2010	9.5
	BEYTEK EL. ÜR. A.Ş. (ÇATALOLUK HES)	9.540	grid connected	run-off	07.04.2010	31
	NİSAN E.MEKANİK EN. (BAŞAK REG. HES)	6.850	grid connected	run-off	09.04.2010	22
	UZUNÇAYIR HES (Tunceli) (İlave)	27.330	grid connected	dam	11.04.2010	107.32
	FIRTINA ELEKTRİK ÜR. A.Ş. (SÜMER HES)	21.600	grid connected	run-off	16.04.2010	70
	KAR-EN KARADENİZ EL.A.Ş. ARALIK HES	12.410	grid connected	run-off	30.04.2010	56
	BİRİM HİDR. ÜRETİM AŞ. (ERFELEK HES)	3.225	grid connected	run-off	14.05.2010	9.5
	KARADENİZ EL.ÜRET. (UZUNDERE-1 HES)	31.076	grid connected	run-off	27.05.2010	82.5
	AKIM ENERJİ (CEVİZLİK REG. VE HES)	91.400	grid connected	run-off	28.05.2010	330
	ÇAKIT HES (ÇAKIT ENERJİ A.Ş.)	20.180	grid connected	run-off	01.06.2010	96
	CEYHAN HES (OŞKAN HES) (ENOVA EN.)	23.889	grid connected	run-off	03.06.2010	98
	ERENLER REG. ve HES (BME BİR.MÜT.EN.)	45.000	grid connected	run-off	04.06.2010	85
	PAŞA REG. VE HES (ÖZGÜR ELEKTRİK)	8.680	grid connected	run-off	11.06.2010	34
	GÜZELÇAY-I HES (İLK ELEKTRİK ENERJİ)	3.140	grid connected	run-off	15.06.2010	16.669
	KALE REG. VE HES (KALE ENERJİ ÜR.)	34.140	grid connected	run-off	16.06.2010	116
	ERİKLİ-AKOCAK REG. ve AKOCAK HES	41.250	grid connected	run-off	30.06.2010	128.5
	ÇAMLIKAYA REG. VE HES	5.648	grid connected	run-off	30.06.2010	19
	DİNAR HES (ELDA ELEKTRİK ÜRETİM)	4.440	grid connected	run-off	03.07.2010	15
	DAMLAPINAR HES (CENAY ELEKTRİK ÜR.)	16.424	grid connected	run-off	08.07.2010	92
	DİM HES (DİLER ELEKTRİK ÜRETİM)	38.250	grid connected	run-off	08.07.2010	123
	ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	5.913	grid connected	run-off	10.07.2010	21.547
	KİRPİLİK REG. VE HES (ÖZGÜR ELEKTRİK)	6.240	grid connected	run-off	11.07.2010	22
	YAVUZ REG. VE HES (MASAT ENERJİ)	22.500	grid connected	run-off	14.07.2010	83
	KAYABÜKÜ REG. VE HES (ELİTE ELEKT.)	14.580	grid connected	run-off	21.07.2010	49
	ERİKLİ-AKOCAK REG. ve AKOCAK HES	41.250	grid connected	run-off	29.07.2010	128.5
	GÖK REG. ve HES (GÖK ENERJİ EL. SAN.)	10.008	grid connected	run-off	06.08.2010	43
	BULAM REG. VE HES (MEM ENERJİ ELK.)	7.030	grid connected	run-off	10.08.2010	33
	KARŞIYAKA HES (AKUA ENERJİ ÜRET.)	1.592	grid connected	run-off	28.08.2010	8
	CEYHAN HES (BERKMAN HES)(ENOVA EN.)	12.605	grid connected	run-off	20.08.2010	51.5
	GÜDÜL I REG. VE HES (YAŞAM ENERJİ)	2.360	grid connected	run-off	25.08.2010	14
	CEYHAN HES (BERKMAN HES)(ENOVA EN.)	12.605	grid connected	run-off	28.08.2010	51.5
	TEKTUĞ ELEKTRİK (ANDIRIN HES)	40.500	grid connected	run-off	03.09.2010	106
	SELEN ELEKTRİK (KEPEZKAYA HES)	28.000	grid connected	run-off	06.09.2010	124
	REŞADİYE 2 HES (TURKON MNG ELEKT.)	26.140	grid connected	run-off	17.09.2010	210
	KOZAN HES (SER-ER ENERJİ)	4.000	grid connected	run-off	21.09.2010	9
	KAHRAMAN REG. VE HES (KATIRCIOĞLU)	1.420	grid connected	run-off	30.09.2010	6
	NARİNKALE REG. VE HES (EBD ENERJİ)	3.100	grid connected	run-off	30.09.2010	10
	ERENKÖY REG. VE HES (TÜRKERLER)	21.456	grid connected	run-off	07.10.2010	87
	KAHTA I HES (ERDEMYILDIZ ELEK. ÜRT.)	7.120	grid connected	run-off	14.10.2010	35
	AZMAK-II REG. VE HES (Düzeltme)	-18.066	grid connected	run-off	25.10.2010	0
	ULUABAT KUVVET TÜNELİ VE HES	48.510	grid connected	dam	27.10.2010	186
	SABUNSUYU II HES (ANG ENERJİ ELK.)	7.350	grid connected	run-off	28.10.2010	21
	BURÇ BENDİ VE HES (AKKUR ENERJİ)	27.330	grid connected	run-off	04.11.2010	113
	KARADENİZ EL. (UZUNDERE-1 HES)(İlave)	31.076	grid connected	run-off	07.11.2010	82.5

	MURGUL BAKIR (Ç.Kaya) (İlave)	19.602	grid connected	run-off	11.11.2010	40.5
	GÜZELÇAY-II HES (İLK ELEKTRİK ENERJİ)	4.960	grid connected	run-off	11.11.2010	26.3
	ULUABAT KUVVET TÜNELİ VE HES (İlave)	48.510	grid connected	dam	25.11.2010	186
	REŞADİYE 1 HES (TURKON MNG ELEKT.)	15.680	grid connected	run-off	26.11.2010	126
	EGEMEN 1 HES (ENERSİS ELEKTRİK)	8.820	grid connected	run-off	26.11.2010	319
	YEDİGÖZE HES (YEDİGÖZE ELEKTRİK)	155.330	grid connected	dam	02.12.2010	474
	UMUT III REG. VE HES (NİSAN ELEKTR.)	12.000	grid connected	run-off	13.12.2010	26
	FEKE 2 BARAJI VE HES (AKKUR ENERJİ)	69.340	grid connected	dam	24.12.2010	223
	EGEMEN 1B HES (ENERSİS ELEKTRİK)	11.100	grid connected	run-off	28.12.2010	40.08
	KALKANDERE REG. VE YOKUŞLU HES	14.540	grid connected	run-off	30.12.2010	63
					Hydro total	**4937.483**
Wind	ROTOR ELEKTRİK (OSMANİYE RES)	20.000	grid connected	wind	14.01.2010	75.5
	ASMAKİNSAN (BANDIRMA 3 RES)	20.000	grid connected	wind	26.02.2010	70.83
	SOMA ENERJİ ÜRETİM (SOMA RES)	4.500	grid connected	wind	10.03.2010	15
	ROTOR ELEKTRİK (OSMANİYE RES)	17.500	grid connected	wind	10.03.2010	66.11
	DENİZ ELEKTRİK (SEBENOBA RES)	10.000	grid connected	wind	12.03.2010	36.66
	AKDENİZ ELEKTRİK (MERSİN RES)	33.000	grid connected	wind	19.03.2010	100
	ASMAKİNSAN (BANDIRMA 3 RES)	4.000	grid connected	wind	26.03.2010	14.16
	BOREAS ENERJİ (BOREAS I ENEZ RES)	15.000	grid connected	wind	09.04.2010	49
	ROTOR ELEKTRİK (OSMANİYE RES)	17.500	grid connected	wind	09.04.2010	66.11
	BERGAMA RES EN. ÜR. A.Ş. ALİAĞA RES	52.500	grid connected	wind	09.04.2010	207.08
	BAKRAS EN. ELKT.ÜR. A.Ş. ŞENBÜK RES	15.000	grid connected	wind	22.04.2010	47
	ALİZE ENERJİ (KELTEPE RES)	1.800	grid connected	wind	28.04.2010	6.34
	ROTOR ELEKTRİK (GÖKÇEDAĞ RES)	20.000	grid connected	wind	05.06.2010	75.5
	SOMA ENERJİ ÜRETİM (SOMA RES)	7.200	grid connected	wind	10.06.2010	24
	BERGAMA RES EN. ÜR. A.Ş. ALİAĞA RES	37.500	grid connected	wind	16.06.2010	147.91
	MAZI-3 RES ELEKTRİK (MAZI-3 RES)	7.500	grid connected	wind	18.06.2010	26.25
	BORASKO ENERJİ (BANDIRMA RES)	12.000	grid connected	wind	30.06.2010	47.78
	ZİYARET RES (ZİYARET RES ELEKTRİK)	12.500	grid connected	wind	15.07.2010	50
	SOMA ENERJİ ÜRETİM (SOMA RES)	7.200	grid connected	wind	28.07.2010	24
	SOMA RES (BİLGİN RÜZGAR SAN. EN.ÜR.)	32.500	grid connected	wind	13.08.2010	110.86
	SOMA ENERJİ ÜRETİM (SOMA RES)	6.300	grid connected	wind	20.08.2010	21
	BELEN ELEKTRİK (BELEN RES) (İlave)	6.000	grid connected	wind	02.09.2010	19
	ÜTOPYA ELEKTRİK (DÜZOVA RES) (İlave)	15.000	grid connected	wind	03.09.2010	46
	SOMA RES (BİLGİN RÜZGAR SAN) (İlave)	27.500	grid connected	wind	23.09.2010	93.8
	SOMA ENERJİ ÜRETİM (SOMA RES) (İlave)	9.000	grid connected	wind	01.10.2010	30
	ZİYARET RES (ZİYARET RES ELEK.)(İlave)	22.500	grid connected	wind	13.10.2010	90
	ROTOR ELEKTRİK (GÖKÇEDAĞ RES) (İlave)	2.500	grid connected	wind	15.10.2010	9.4
	SOMA RES (BİLGİN RÜZGAR SAN.)(İlave)	30.000	grid connected	wind	11.11.2010	102.33
	KUYUCAK RES (ALİZE ENERJİ ÜRET.)	8.000	grid connected	wind	11.11.2010	34.375
	KUYUCAK RES (ALİZE ENERJİ ÜR.) (İlave)	17.600	grid connected	wind	09.12.2010	75.625
	SARES RES (GARET ENERJİ ÜRETİM)	15.000	grid connected	wind	22.12.2010	60
	TURGUTTEPE RES (SABAŞ ELEKTRİK ÜR.)	22.000	grid connected	wind	30.12.2010	64
					Wind total	**1905.62**
	CDM registered projects are indicated with colour					

Table 31: Power plants added to capacity in year 2009

Power plants added to capacity in year 2009 (only grid connected ones)	**Installed capacity (MW)**	**Electricity generation (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		
ORTADOĞU ENERJİ (ODA YERİ) (İlave)	5.7	77.953	waste
		144.953	**Waste total**
ALKİM ALKALİ KİMYA (Cihanbeyli/KONYA)	0.4	3	lignite
SİLOPİ ELEKTRİK ÜRETİM A.Ş.	135	945	asfaltit

İÇDAŞ ÇELİK (İlave)	2x135	1923.33	imported coal
		2871.33	**Coal total**
GÜRMAT ELEKT. (GÜRMAT JEOTERMAL)	47.4	**313**	**Geothermal total**
CARGILL TARIM VE GIDA SAN. TİC. A.Ş.	0.1	**0.7**	**Biogas total**
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		
MAURİ MAYA SAN. A.Ş.	2	19	N.Gas
TAV İSTANBUL TERMİNAL İŞLETME. A.Ş.	3.3		
TAV İSTANBUL TERMİNAL İŞLETME. A.Ş.	6.5	82	N.Gas
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		
ENTEK KÖSEKÖY(İztek) (Düzeltme)	36.3	98.68	N.Gas
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		
AKSA ENERJİ (Antalya) (İlave)	300		
AKSA ENERJİ (Antalya) (İlave)	300	4744.74	N.Gas
AKSA ENERJİ (MANİSA) (İlave)	10.5		
AKSA ENERJİ (MANİSA) (İlave)	52.4	498.072	N.Gas
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		
DELTA ENERJİ ÜRETİM VE TİC.A.Ş. (İlave)	13	467	N.Gas
DESA ENERJİ ELEKTRİK ÜRETİM A.Ş.	9.8	70	N.Gas
		10089.155	**N. Gas total**
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
		777.79	**Fuel oil total**
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		
AYEN ENERJİ A.Ş. AKBÜK RÜZGAR (İlave)	14.7	123	Wind
BAKİ ELEKTRİK ŞAMLI RÜZGAR	36		
BAKİ ELEKTRİK ŞAMLI RÜZGAR	33	337.33	Wind
BELEN ELEKTRİK BELEN RÜZGAR-HATAY	15		
BELEN ELEKTRİK BELEN RÜZGAR-HATAY	15	95	Wind
BORASKO ENERJİ (BANDIRMA RES)	21		
BORASKO ENERJİ (BANDIRMA RES)	24	179	Wind
DATÇA RES (Datça)	0.8		
DATÇA RES (Datça)	8.9		
DATÇA RES (Datça) (İlave)	11.8	61.0135	Wind
KORES KOCADAĞ RES (Urla/İZMİR)	15	56	Wind
MAZI-3 RES ELEKT.ÜR. A.Ş. (MAZI-3 RES)	10		
MAZI-3 RES ELEKT.ÜR. A.Ş. (MAZI-3 RES)	12.5	79	Wind
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		
SOMA ENERJİ ÜRETİM (SOMA RES)(İlave)	10.8		
SOMA ENERJİ ÜRETİM (SOMA RES)(İlave)	16.2	150	Wind
ÜTOPYA ELEKTRİK (DÜZOVA RES)	15	46	Wind
		1649.7115	**Wind total**
YAPISAN (KARICA REG. ve DARICA I HES)	48.5		
YAPISAN (KARICA REG. ve DARICA I HES)	48.5	328	Hydro
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		
BAĞIŞLI REG. VE HES (CEYKAR ELEKT.)	19.7	99	Hydro
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		
ERVA ENERJİ (KABACA REG. VE HES)	4.2	33	Hydro
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		
ÖZYAKUT ELEK. ÜR.A.Ş. (GÜNEŞLİ HES)	1.2	8	Hydro
ŞİRİKÇİOĞLU EL.(KOZAK BENDİ VE HES)	4.4	15	Hydro
TAŞOVA YENİDEREKÖY HES (HAMEKA A.Ş.)	2	10	Hydro
TEKTUĞ (Erkenek)	6		
TEKTUĞ (Erkenek) (İlave)	6.5	50	Hydro
SARITEPE HES (GENEL DİNAMİK SİS.EL.)	2.5		
SARITEPE HES (GENEL DİNAMİK SİS.EL.)	2.5	20	Hydro
		2372.425	**Hydro total**
CDM registered projects are indicated with colour			

Table 32: Power plants added to capacity in year 2008

Power plants added to capacity in year 2008	Installed capacity (MW)	Electricity generation (GWh)	Fuel type
AKSA ENERJİ (Antalya)	183.8	1290	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	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
MİSİS APRE TEKSTİL BOYA EN. SAN.	2	5.3	N.Gas
MODERN ENERJİ (LÜLEBURGAZ)	13.4	508.9	N.Gas
POLAT TURZ. (POLAT RENAISSANCE İST.OT.)	1.6	490	N.Gas
YILDIZ SUNTA (Uzunçiftlik-Köseköy)(Düzeltme)	22.6	136	N.Gas

SÖNMEZ Elektrik (İlave)	8.7	61	N.Gas
		1960.6	**N. Gas total**
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	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 REGÜLATÖRÜ 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	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
		269.528	**Hydro total**
BAKİ ELEKTRİK ŞAMLI RÜZGAR	21	60.943	Wind
DATÇA RES (Datça)	8.1	3.778	Wind
ERTÜRK ELEKTRİK Çatalca RES	60	65.961	Wind
İNNORES ELK YUNTDAĞ RÜZG. (Aliağa)	42.5	98.058	Wind
LODOS RES (Taşoluk)(G.O.P./İSTANBUL)	24	25.714	Wind
SAYALAR RÜZGAR (Doğal Enerji)	30.6	53.925	Wind
SEBENOBA (DENİZ ELK.) (Samandağ-HATAY)	31.2	46.919	Wind
		355.298	**Wind total**
KARKEY(SİLOPİ-5) (154 kV) (İlave)	14.8	**16.4**	**Fuel oil**
SARAYKÖY JEOTERMAL (Denizli)	6.9	**14.1**	**Geothermal**
CDM registered projects indicated with color			
Auto producers which are not connected to grid indicated with color			

For CDM registered projects, *the VSC and GS project database were searched for registered CDM renewable energy production project in TR. The names of the projects were researched from the capacity addition source (the forecast projection report of Turkey). It should be noted that, there is not a list of projects registered to CDM in TR. Hence, this search type by own study of consultant is required to determine the capacity addition which tool requires.)*

Annex 4

MONITORING INFORMATION

Please see Section B.7 for detailed information.
