

**Gold Standard for the Global Goals
Transition Annex**
*(To be used by all GS CDM/VER stand alone projects and PoAs,
Micro Scale stand alone projects and Micro PoAs)*



Version 1 – September 2017

KEY PROJECT INFORMATION

Title of Project/PoA/Activity:	CEMEL HYDRO BUNDLE
GS ID of the project/PoA/activity:	GS1208
GS Version:	2.1
Brief description of Project:	The project is a large scale hydro power plant (HEPP) project located in Avanos District of Nevşehir province, Turkey. The project has a capacity of 21.6 MWm and 20.4 MWe and a production capacity of 73.95 GWh. As per the license issued by Energy Market Regulatory Authority (EMRA), all legal rights of the project is given to Zeynep Enerji Üretim A.Ş. for 44 years 11 months.
Project type: Energy/Land Use	Energy
For Renewable Energy Projects – intention to apply RECs Labels (y/n)	No
GS Stream (CDM/VER):	VER
Scale (large/scale/micro):	Large
GS Registration Date:	01/10/2013
GS Crediting period start date:	01/07/2015
CDM Registration Date:	-
CDM Crediting period start date:	-
Project Developer:	GTE Karbon Sürdürülebilir Enerji Eğitim Danışmanlık ve Ticaret A.Ş.
Project Representative:	Zeynep Enerji Üretim San. Ve Tic. A.Ş
Project Participants and any communities involved:	Zeynep Enerji Üretim San. Ve Tic. A.Ş (Project Owner) GTE Karbon Sürdürülebilir Enerji Eğitim Danışmanlık ve Ticaret A.Ş. (Project Developer)
Host Country/Location:	Turkey / Nevşehir province
Methodologies applied:	Methodology: ACM0002 “Consolidated baseline methodology for grid connected electricity generation from renewable sources”, ver 12.3.0
SDG Impacts:	1 – Affordable and Clean Energy (SDG 7): The project promotes clean and sustainable energy production and use. The project is expected to generate 73.95 GWh of clean energy per annum and contributes to share of low-cost / must-run sources. 2 – Industry, Innovation and Infrastructure (SDG 9): The project includes the installation of one clean energy production plant which provides quality, reliable, sustainable and resilient infrastructure to support economic development and human well-being, with a focus on affordable and equitable access for all. 3 – Climate Action (SDG 13): The project contributes to SDG Target 13 with an amount of 40,006 tonnes of CO₂e, which represent direct and quantifiable impact on climate security.
Estimated amount of SDG Impact (GSVERs and others)	73.95 GWh electricity 1 clean energy production plant 40,006 tonnes CO ₂

SECTION A Sustainable Development Goals (SDG) outcomes

A.1 Relevant target for each of the three SDGs

1 – Affordable and Clean Energy (SDG 7): The project promotes clean and sustainable energy production and use.

“By 2030, increase substantially the share of renewable energy in the global energy mix.”¹

2 – Industry, Innovation and Infrastructure (SDG 9): The project provides infrastructural benefits for all.

“Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all”²

3 – Climate Action (SDG 13): The project contributes to SDG Target 13 with an expected amount of 40,006 tonnes of CO₂e, which represent direct and quantifiable impact on climate security.

“Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.”³

A.2 Explanation of methodological choices/approaches for estimating the SDG outcome

SDG 7: Affordable and Clean Energy (Ensure access to affordable, reliable, sustainable and modern energy for all)

The baseline for the project is no project, thus leading to generation in the relevant grid which is dominated by fossil fuel (73.8 % in 2010) and this is one of the methodological reason for choosing simple OM method to calculate emission factor. The clean energy generated by the project is calculated based on the amount of electricity generated by the project per annum. The project is expected to generate 73.95 GWh of clean energy per annum and contributes to share of low-cost / must-run sources. Hence, contribution of the project could be followed via indicator “Renewable energy share in the total final energy consumption” and following target: “By 2030, increase substantially the share of renewable energy in the global energy mix”. This project increases the renewable energy sharing of global energy mix and contribute to improved air quality by reducing air pollution.

Generation data will be recorded by two metering devices continuously. These records will provide the data for the monthly invoicing to TEIAS. Generation will be recorded via remote reading system. This record will form the basis for monthly invoicing.

Internal consumption which indicates the usage in the project site is read from monthly records taken from the meters.

SDG 9: Industry, Innovation and Infrastructure (Build resilient infrastructure, promote sustainable industrialization and foster innovation):

The project promotes quality, reliable, sustainable and resilient infrastructure for energy generation in Turkey, where energy demand is continuously increasing. Therefore, project presents clean and reliable energy source accessible for all.

¹ <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-7-affordable-and-clean-energy.html#targets>

² <https://www.un.org/sustainabledevelopment/infrastructure-industrialization/>

³ <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-13-climate-action.html#targets>

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SDG13 : Climate Action (Taking urgent action to combat climate change and its impacts):

The project leads to mitigation of 40,006 tCO₂ per annum. The project contributes to the target of SDG 13 which could be expressed via following indicator:

“Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning”: The project’s contribution is done through training and awareness raising of local people and setting good example by investing to the climate friendly technology.

Emission factor has been calculated in a conservative manner as required by the methodology. Basic assumptions made are;

- Emission factor will remain same over the crediting period,
- Emission factor of fuels sources is “0” or the lowest value in the references when there is no information.

For the calculation of the emission factor of Turkish Grid, “Tool to Calculate the Emission Factor for an Electricity System”, has been used.

Since the share of low-cost / must-run sources is below 50%, method (d) is eliminated. Also due to insufficiency of the available data, methods (b) and (c) are not considered and thus (a) simple OM method is used in calculations. The following table is used for demonstrating the share of low cost/must run resources.

ANNUAL DEVELOPMENT OF GENERATION IN TURKEY					
	GENERATION (GWh)				
YEARS	THERMAL	HYDRO	GEOTHERM.WIND	TOTAL	% Low Cost Must Run
1970	5590.2	3032.8	0	8623.0	35%
1971	7170.9	2610.2	0	9781.1	27%
1972	8037.7	3204.2	0	11241.9	29%
1973	9821.8	2603.4	0	12425.2	21%
1974	10121.2	3355.8	0	13477.0	25%
1975	9719.2	5903.6	0	15622.8	38%
1976	9908.0	8374.8	0	18282.8	46%
1977	11972.3	8592.3	0	20564.6	42%
1978	12391.3	9334.8	0	21726.1	43%
1979	12218.3	10303.6	0	22521.9	46%
1980	11927.2	11348.2	0	23275.4	49%
1981	12056.7	12616.1	0	24672.8	51%
1982	12384.8	14166.7	0	26551.5	53%
1983	16004.1	11342.7	0	27346.8	41%
1984	17165.1	13426.3	22.1	30613.5	44%
1985	22168.0	12044.9	6.0	34218.9	35%
1986	27778.6	11872.6	43.6	39694.8	30%
1987	25677.2	18617.8	57.9	44352.9	42%
1988	19030.8	28949.6	68.4	48048.8	60%
1989	34041.0	17939.6	62.6	52043.2	35%
1990	34314.9	23148.0	80.1	57543.0	40%
1991	37481.7	22683.3	81.3	60246.3	38%
1992	40704.6	26568.0	69.6	67342.2	40%
1993	39779.0	33950.9	77.6	73807.5	46%

1994	47656.7	30585.9	79.1	78321.7	39%
1995	50620.5	35540.9	86.0	86247.4	41%
1996	54302.8	40475.2	83.7	94861.7	43%
1997	63396.9	39816.1	82.8	103295.8	39%
1998	68702.9	42229.0	90.5	111022.4	38%
1999	81661.0	34677.5	101.4	116439.9	30%
2000	93934.2	30878.5	108.9	124921.6	25%
2001	98562.8	24009.9	152.0	122724.7	20%
2002	95563.1	33683.8	152.6	129399.5	26%
2003	105101.0	35329.5	150.0	140580.5	25%
2004	104463.7	46083.7	150.9	150698.3	31%
2005	122242.3	39560.5	153.4	161956.2	25%
2006	131835.1	44244.2	220.5	176299.8	25%
2007	155196.2	35850.8	511.1	191558.1	19%
2008	164139.3	33269.8	1008.9	198418.0	17%
2009	156923.4	35958.4	1931.1	194812.9	19%
2010	155827.6	51795.5	3584.6	211207.7	26%

Table 1. Breakdown by source of the electricity generation⁴

The methodology has been applied in a conservative manner. Tools addressed by the applied methodology have been used to calculate baseline, project and leakage emissions. The equations used are:

$$\begin{aligned}
 & \bullet \quad EF_{grid, OM, simple, y} = \frac{\sum_{i,m} FC_{i,y} * NCV_{i,y} * EF_{CO_2, i, y}}{EG_y} \\
 & \bullet \quad EF_{grid, BM, y} = \frac{\sum EG_{m,y} * EF_{EL, m, y}}{\sum EG_{m,y}} \\
 & \bullet \quad EF_{grid, CM, y} = w_{OM} * EF_{grid, OM, y} + w_{BM} * EF_{grid, BM, y} \\
 & \bullet \quad ERY = BE_y - PE_y - LE_y \quad (4) \\
 & \bullet \quad BE_y = EG_y * EF_y \\
 & \bullet \quad PD = \frac{CapPJ - CapBL}{(APJ - ABL)}
 \end{aligned}$$

Figure 1. Equations used for the baseline calculations

A.3 Data and parameters fixed ex ante for monitoring contribution to each of the three SDGs

Relevant SDG Indicator	7.2.1 “Renewable energy share in the total final energy consumption” 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions”
Data/parameter	EG _y ,

⁴ [http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m\(13-21\)/13.xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m(13-21)/13.xls)

Unit	GWh
Description	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must run power plants in year y
Source of data	For gross generation electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must run power plants in year y : http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010%C3%A7i%C3%A7ek%20kitap/kgucunkullan%C4%B1m(13-21)/13.xls For net generation and imported electricity http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/33(84-10).xls
Value(s) applied	157,706.6 in 2008 151,144.7 in 2009 150,894,2 in 2010 459,745 .428 GWh between 2008-2010
Choice of data or Measurement methods and procedures	Data from Grid Operator has been used.
Purpose of data	Data used for emission reduction calculation (for calculation of OM, Netto-Gross electricity ratio and share of low-cost must-run sources)
Additional comment	-

Relevant Indicator	SDG	7.2.1 “Renewable energy share in the total final energy consumption” 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions”
Data/parameter	EFCO ₂ , i, y i	
Unit	tCO ₂ /TJ	
Description	CO ₂ emission factor of fossil fuel type “i” in year “y”	
Source of data	For EF of fossil fuels, IPCC values at the lower limit have been used	
Value(s) applied	Fuel Source	EF(tCO₂/Tj)
	Coal	89.5
	Lignite	90.9
	Fuel Oil	75.5
	Diesel	72.6
	LPG	61.6
	Naphtha	69.3
	Natural Gas	54.3

Choice of data or Measurement methods and procedures	According to the applied tool, IPCC default values at lower limit of 95% confidence interval can be used. Although, the actual emission reduction is expected to be higher due to high EF of fuels consumed in existing power plants, IPCC values have been used for conservativeness as requested by the methodology.
Purpose of data	EF calculations
Additional comment	-

Relevant SDG Indicator	7.2.1 “Renewable energy share in the total final energy consumption” 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions”
Data/parameter	$\eta_{m,y}$
Unit	-
Description	Average net energy efficiency of power unit m in year y
Source of data	Default values provided in Annex 3 of the “Tool to calculate the emission factor for an electricity system”.
Value(s) applied	See Annex 3
Choice of data or Measurement methods and procedures	Data source is selected as per the applied tool.
Purpose of data	Data used for BM calculation
Additional comment	-

Relevant SDG Indicator	7.2.1 “Renewable energy share in the total final energy consumption” 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions”
Data/parameter	$FC_{i,y}$
Unit	Tons or 1000 m ³ for gases
Description	Amount of fuels consumed by thermal power plants for electricity generation in terms of fossil fuel type i in year y
Source of data	TEIAS web page (http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/47.xls)
Value(s) applied	See Annex 3
Choice of data or Measurement methods and procedures	Data from Grid Operator has been used
Purpose of data	Data used for OM calculation
Additional comment	-

Relevant SDG Indicator	7.2.1 “Renewable energy share in the total final energy consumption” 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions”
Data/parameter	$NCV_{i,y}$
Unit	Tj/kt
Description	Net calorific value (energy content) of fossil fuel type i in y
Source of data	TEIAS web page (http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/yak%C4%B1t46-49/49.xls)
Value(s) applied	See Annex 3
Choice of data or Measurement methods and procedures	Data has been calculated from Grid Operator’s (TEIAS) statistics
Purpose of data	Data used for OM and BM calculation
Additional comment	-

Relevant SDG Indicator	7.2.1 “Renewable energy share in the total final energy consumption” 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions”
Data/parameter	Cap_{BL}
Unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity.
Source of data	Project Site
Value(s) applied	0
Choice of data or Measurement methods and procedures	The project activity is the new grid-connected renewable power plant at a site where no renewable power plant was operated
Purpose of data	Data used for PE calculation
Additional comment	-

Relevant SDG Indicator	7.2.1 “Renewable energy share in the total final energy consumption”
Data/parameter	A_{BL}
Unit	m ²
Description	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full
Source of data	Project Site
Value(s) applied	0

Choice of data or Measurement methods and procedures	The project activity is the new grid-connected renewable power plant at a site where no renewable power plant was operated. There was no reservoir.
Purpose of data	Data used for PE calculation
Additional comment	-

SECTION B Safeguarding Principles Assessment

B.1 Analysis of social, economic and environmental impacts

Safeguarding principles	Assessment questions	Assessment of relevance to the project (Yes/potentially/no)	Justification	Mitigation measure (if required)
3.2 Gender Equality and Women's Rights	Is there a possibility that the project might reduce or put at risk women's access to or control of resources, entitlements and benefits?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment ⁵ .	No mitigation measure is required for this indicator.
	Is there a possibility that the project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	Is there a possibility that the project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.

⁵ <http://www.ilo.org/ankara/areas-of-work/equality-discrimination/lang--tr/index.htm>

	of the project's activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)?			
	Does the project take into account gender roles and the abilities of women or men to benefit from the project's activities (e.g., Does the project criteria ensure that it includes minority groups or landless peoples)?	Yes	The project outputs serve everyone without regarding gender. It provides electricity for all.	No mitigation measure is required for this indicator.
	Does the project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	Would the project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.

	Would the project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and priorities of women and men in accessing and managing environmental goods and services?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	Is there a likelihood that the proposed project would expose women and girls to further risks or hazards?	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	The project is not directly or indirectly contribute sexual harassment and/or any forms of violence against women – address the multiple risks of gender-based violence, including sexual exploitation or human trafficking.	No	Turkey has ratified European Convention on Human Right on 10/03/1954, which includes the right to life as well as prohibition of torture, slavery, discrimination and forced labor.	No mitigation measure is required for this indicator.
	The project is not directly or indirectly contribute slavery, imprisonment, physical and mental drudgery, punishment or	No	Turkey has ratified European Convention on Human Right on 10/03/1954, which includes the right to life as well as prohibition of torture, slavery,	No mitigation measure is required for this indicator.

	coercion of women and girls.		discrimination and forced labor.	
	The project is not directly or indirectly contribute restriction of women's rights or access to resources (natural or economic).	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	The project is not directly or indirectly contribute recognise women's ownership rights regardless of marital status – adopt project measures where possible to support to women's access to inherit and own land, homes, and other assets or natural resources.	No	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality and promotes women's employment.	No mitigation measure is required for this indicator.
	Where appropriate for the implementation of the project, paid, volunteer work or community contributions will be organised to provide the conditions for equitable participation of men and women in the identified tasks/activities.	Yes	The project promotes equal participation of man and women. Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality.	No mitigation measure is required for this indicator.
	The project introduces conditions that ensure the	Yes	Turkey has ratified ILO convention 100, 111, 122 and 142, which	No mitigation measure is required for this indicator.

	participation of women or men in project activities and benefits based on pregnancy, maternity/paternity leave, or marital status. The project also ensures that these conditions do not limit the access of women or men, as the case may be, to project participation and benefits.		provides gender equality.	
	The project refers to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks.	Yes	Turkey has ratified ILO convention 100, 111, 122 and 142, which provides gender equality. It also shows parallelity with national strategies prepared for women employment by creating opportunities for all. However, there is no women working directly in the site. Women in the region mostly take roles in agricultural and husbandary activities.	No mitigation measure is required for this indicator.
3.4.3 Land Tenure and Other Rights	a. Does the Project require any change to land tenure arrangements and/or other rights?	a.No b. Not relevant	The area between regulators will be approximately 10 ha. ⁶	This area will be expropriated according to the Turkish Expropriation Law.

⁶ FSR_Revised, page 30

	b. For Projects involving land-use tenure, are there any uncertainties with regards land tenure, access rights, usage rights or land ownership?			The expropriation value is expected to be approximately TL/m ² for private properties. ⁶
3.6.2 Negative Economic Consequences	The Project Developer demonstrates the financial sustainability of the project, also including those that will occur beyond the Project Certification period.	Yes	Investment analysis has been done for the project.	No mitigation needed for this indicator.
	The project considers economic impacts and demonstrate a consideration of potential risks to the local economy and how these have been taken into account in project design, implementation, operation and after the project.	Yes	The project involved electricity generation from local and renewable sources. Since Turkey is dependent on import fuel (mainly natural gas and coal), project will not generate any risk but contribute to local economy.	No mitigation is needed for this indicator.
4.1.1 Emissions	Will the project increase greenhouse gas emissions over the baseline scenario?	No	Since it is a hydro energy power plant, the project is expected to have a positive impact on Climate Change by eliminating fossil fuels. Expected amount of CO ₂ e: 40,006 tonnes.	No mitigation measure is required for this indicator.

4.1.2 Energy Supply	Will the project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No	Project does not use any local fuel resource. It is connected to the national grid and supply 73.95 GWh additional energy to the grid. Internal consumption which indicates the usage in the project site is read from monthly records taken from the meters.	No mitigation measure is required for this indicator.
4.2.1 Impact on natural water patterns and flow	Will the project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	No	Project is run-of-river type and it uses the existing water on the river and releases back to river within 50 m. Since there is no conveyance line, no minimum flow is determined or gauging station is required for the project activity. Also the project is subject to water utilization right agreement dated 05/11/2010. Nearby irrigation facilities or fishing fish migration will not be affected. Design of the fish passage has been done according to the report dated on 12/08/2012 and DSI (State Hydraulic Works) criteria which requires free and continuous flow of	No mitigation is needed.

			water from fish passage. During construction, continuous flow will be achieved to ensure that affect on fish habitat is minimum. The weir will prevent the isolation of fish and organisms by providing a steady minimal flow, even when water level decreases. Project is impoundment type HEPP. Hence, there is no diversion of flow from natural river bed or storage capacity. Therefore, project can not affect the flow pattern of the river. AS per the water utilization rights agreement, project owner has to release all water when the minimum flow is below 10% of average flow. In practice, due to technical limitations about operation of turbines, all incoming flow is released without electricity generation when the flow is less than 30% of turbine capacity to prevent damage to the turbines. The functionality of the fish passage	
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			design of the project has been reviewed by independent experts at time of construction upon request of GS. Design of the fish passage has been renewed upon recommendation of those experts and renewed design has been implemented by project owner. The report of expert has been submitted to GS during registration and 1st verification.	
4.2.1 Erosion and/or water body stability	Could the project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion?	No	Project does not have any impact on erosion. The main construction activities are powerhouse, weir and fish passage constructions. Excavation aggregate is formed at all three sites and excavated soil is disposed appropriately and used for landscaping.	Project had excavation work on the all three project sites. Since the project sites are near the existing road which is paved already, no significant dust due to vehicles are expected however, to minimize the impact, construction site was irrigated regularly to avoid dust.⁷ To avoid dust problem in the village, trucks were covered during the transportation of the excavated soil.¹⁴ Also during the storage of the

⁷ PIF, page 188

				excavated soil, the top layer of the soil was kept with a %10 humidity ration to avoid the dust problem. Project is subject to a comprehensive dust formation modelling due to cement production. All the necessary procedures were followed and it has been proved that the project dust emissions are below the regulative limit values for particulate matters. Project will have an impoundment type of weir and no conveyance line is going to be built. Design of the Project ensures that the Project will only use a small area. A part of the excavation from the construction activities will be used to support the river side line as a precaution against flooding and some will be used for construction purposes. Remaining excavation will be stored in predesignated areas. Vertical penstocks on the
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				body of regulators will be used as gravel pass in transferring the sediment that may be cumulated in the headwater to the downstream. ⁸
4.2.3 Landscape modification and soil	Does the Project involve the use of land and soil for production of crops or other products?	No	The project site is located in the relatively plane area where the slope of Kızılırmak River decreases. Therefore, there is alluvial soil used for agricultural purpose in both side of the river.	Land is limited within the project contruction phase and there is no negative effect on use of land and soil for production of crops. Although project aim is to generate electricity, irrigation water allocated from the headwater has been considered during project design. ⁹
4.3.1 Landscape modification and soil	Does the project involve the use of land and soil for production of crops or other products?	No	Project site is mainly surrounded by agricultural lands which are not affected and will continue to be cultivated after project activity.	No mitigation measure is required for this indicator.
4.3.2 Vulnerability to Natural Disaster	Will the project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme	Possible	Avanos district is in the 3rd Degree Seismic Zone according to the earthquake zones determined by the General Directorate of Disaster Affairs. ¹⁰	All the design and construction works will be performed in accordance with relevant regulation (Earthquake Code released by the Ministry of Environment and Urbanization,

⁸ FSR_Revised, page 170

⁹ PSR_Revised, page 71

¹⁰ http://ankara.imo.org.tr/resimler/dosya_ekler/ff019c60caaf76b_ek.pdf?tipi=84&turu=X&sube=0

	climatic conditions?			18/03/2018). The code classifies the country into earthquake zones and determines the basis of calculations regarding building construction rules, importance&priority of the buildings and ground conditions.
4.3.3 Genetic Resources	Could the project be negatively impacted by the use of genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development)?	No	The project activity is not relevant to the use of genetically modified organisms or GMOs since it is a renewable energy power plant.	No mitigation is needed.
4.3.4 Release of pollutants	Could the project potentially result in the release of pollutants to the environment?	Potentially	Some pollutants may occur during the construction and operation phase of the project, such as waste oil and domestic waste.	Waste oil and domestic waste generated at the construction site is handled according to the national regulations on handling domestic waste.
4.3.5 Hazardous and Non-hazardous Waste	Will the project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	Potentially	Project was expected to create solid, liquid and particulate wastes/emissions during its construction. Hazardous wastes were also expected such as waste oils in the construction and operation period.	Handling, storage and disposal of these wastes were done according to the Turkish regulations. Solid wastes generated during construction and operation period are expected to be food, package, plastic

				bottles, etc.¹¹ These wastes will be handled according to the “Regulation on Solid Waste Control”. They will be collected separately and disposed, accordingly. Project activities include usage of a mobile concrete production unit. The cement Works will be carried out one by one and the mobile concrete production unit will be transferred to the construction site after each building is complete. There will not be any waste due to cement usage within the Project site as the cement will be supplied in sealed packages from another company.¹² Cement making unit will be operated as per the article 9 of the waste and landscape management regulations numbered 25755, dated 14/03/2005.¹³ Wastewater generated at the site will be handled via cesspool compatible with “Water Pollution Control Regulation”. Collected
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¹¹ PIF, page 125

¹² PIF, page 52

¹³ PIF, page 158

				wastewater will be then transferred to the closest sewer line by sewage trucks.¹⁴ During site preparation works, some amount of waste oil generation is expected. This waste will be handled according to the “Waste Oil Control Regulation”.¹⁵ In order to reduce dust emission during construction, Street sprinklers will be used and the trucks will be covered. “Industrial Air Pollution Control Regulation” precautions will also be implemented such as standing wind barriers, walls and planting trees in the site.¹⁶
4.3.6 Pesticides and fertilizers	Will the project involve the application of pesticides and/or fertilisers?	No	The project is not relevant since it is a renewable energy project.	No mitigation is needed for this indicator.
4.3.7 Harvesting of forests	Will the project involve the harvesting of forests?	No	There is no forest area in and in the close vicinity of the project area.	No mitigation is needed for this indicator.
4.3.8 Food	Does the project modify the quantity or nutritional quality of food available such as through crop regime alteration or export	No	The project is not relevant since it is a renewable energy project.	No mitigation is needed for this indicator

¹⁴ PIF, page 130

¹⁵ PIF, page 148

¹⁶ PIF, page 146

	or economic incentives?			
4.3.9 Animal Husbandry	Will the project involve animal husbandry?	No	The project is not relevant since it is a renewable energy project.	No mitigation is needed for this indicator.

SECTION C Monitoring plan

C.1 Data and parameters to be monitored

Relevant SDG Indicator	SDG 7 - Indicator 7.2.1 – “renewable energy share in the total final energy consumption”
Data / Parameter	EGfacility, y
Unit	GWh
Description	Net Electricity generated and delivered to the grid by Cemel Hydro bundle in year y
Source of data	Records from the metering devices used in the power plant will be used to calculate the annual generation of energy.. PMUM records will be used as a cross-check both for generation and internal consumption.
Value(s) applied	Estimated annual generation forming the basis for emission reduction calculation is 73.95 GWh
Measurement methods and procedures	Generation data will be recorded by two metering devices continuously. These records will provide the data for the monthly invoicing to TEIAS. Generation will be recorded via remote reading system. This record will form the basis for monthly invoicing. Internal consumption which indicates the usage in the project site is read from monthly records taken from the meters.
Monitoring frequency	Continuous measuring and monthly recording
QA/QC procedures	Two calibrated ammeters will backup each other. Maintenance and calibration of the metering devices will be made by TEIAS. If there is a noticeable difference between the readings of two devices, maintenance and tests of the metering devices and the associated equipment will be done before waiting for the periodical maintenance. The meters should comply with EPDK regulations which define the accuracy class of the meters as 0.2 or 0.5 depending on the capacity of the circuit as given in document in link (http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44) Invoices will also be used for crosscheck.
Purpose of data	Emission Reduction calculations
Additional comment	-

Relevant SDG Indicator	7.2.1 “Renewable energy share in the total final energy consumption” 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions”
Data / Parameter	CapPJ
Unit	W

Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site, equipment agreements
Value(s) applied	20.4 MWe
Measurement methods and procedures	Checking project documents and equipment labels
Monitoring frequency	Yearly
QA/QC procedures	-
Purpose of data	Ensuring validity of project documentation
Additional comment	-

Relevant SDG Indicator	7.2.1 “Renewable energy share in the total final energy consumption”
Data / Parameter	A _{PJ}
Unit	m ²
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Source of data	Project site
Value(s) applied	0 Since no new reservoir is created as the project is impoundment type HEPP.
Measurement methods and procedures	Measured from topographical surveys or maps
Monitoring frequency	Yearly
QA/QC procedures	-
Purpose of data	Calculating Power Density
Additional comment	As per the type of the project, it does not have storage capacity and thus it does not create any new reservoir. This has been confirmed by DOE during 1 st verification and also from satellite pictures submitted to GS during registration of the project.

Relevant SDG Indicator/Safeguarding Principle	13.2.1. Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development
Data / Parameter	Air Quality
Unit	tons
Description	Reduction of SO ₂ and NO _x emissions due to implementation of project activity that would otherwise be emitted by thermal power plants
Source of data	Electricity generated by Cemel HEPP and NO _x and SO ₂ emission data from GHG inventory of Turkey will be used as reference in calculation of the emission reduction.

Value(s) applied	Total SO₂ emission related to electricity generation is about 167.89 kt for 2012 according to National Inventory of Turkey¹⁷. Considering that electricity generation in 2012 is 239,496.8 GWh¹⁸, SO₂ emission per MWh is calculated as 0.70 kg/MWh. Total NO_x emission related to electricity generation is about 324.30 kt for 2012 according to National Inventory of Turkey. NO_x emission per MWh is calculated as 1.35 kg/MWh.
Measurement methods and procedures	The net electricity supplied by the Project will be continuously measured and recorded by EPIAS; and will be kept by the Project Owner. NO _x and SO ₂ emission data from GHG inventory of Turkey will be used as reference in calculation of the emission reduction.
Monitoring frequency	Yearly
QA/QC procedures	-
Purpose of data	To calculate the baseline emission value; and also to monitor the contribution to SDG 13 (Take urgent action to combat climate change and its impacts)
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	13.2.1. Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development
Data / Parameter	Emissions Reductions in tCO ₂
Unit	tCO ₂
Description	Reduction of CO ₂ emissions due to implementation of project activity
Source of data	Electricity generated by Cemel HEPP and calculated combined margin (CM) emission factor will be used as reference in calculation of the emission reduction.
Value(s) applied	Estimated annual emission reduction is 40,006 tonnes of CO_{2e} The applied OM & BM for the project are: Operating Margin: 0.641 tCO₂/MWh Build Margin: 0.441 tCO₂/MWh Therefore, the applied Combined margin for the project is 0.541 tCO₂/MWh.
Measurement methods and procedures	The net electricity supplied by the Project will be continuously measured and recorded by EPIAS; and will be kept by the Project Owner. In addition to the EPIAS meters which is used for billing purposes, records taken by meters using at project site will be used for comparison.
Monitoring frequency	Once every monitoring period
QA/QC procedures	-
Purpose of data	To calculate the baseline emission value; and also to monitor the contribution to SDG 13 (Take urgent action to combat climate change and its impacts)
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	Principle 4.2.1 Impact on natural water patterns and flow
Data / Parameter	Biodiversity

¹⁷<https://unfccc.int/sites/default/files/resource/tur-2014-crf-14apr18.zip> ,Worksheet:Table1s1

¹⁸[http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2014/kgucunkullan%C4%B1m\(14-23\)/14.xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2014/kgucunkullan%C4%B1m(14-23)/14.xls)

Unit	-
Description	Functionality of fish passage
Source of data	Fish passage expert report
Value(s) applied	Fish passage will be designed considering river characteristics so the project activity will not cause any significant change or impact biodiversity.
Measurement methods and procedures	The assessment/opinion of independent expert on effectiveness of the fish passage will be included in monitoring report. Expert assessment will be supported by references and local data. Alternatives, additional measures and recommendations will also be discussed in the expert report.
Monitoring frequency	Once after project is completed.
QA/QC procedures	-
Purpose of data	To monitor the project contribution to Principle 4.2.1
Additional comment	Project is impoundment type HEPP. Hence, there is no diversion of flow from natural river bed or storage capacity. Therefore, project can not affect the flow pattern of the river. AS per the water utilization rights agreement, project owner has to release all water when the minimum flow is below 10% of average flow. In practice, due to technical limitations about operation of turbines, all incoming flow is released without electricity generation when the flow is less than 30% of turbine capacity to prevent damage to the turbines. The functionality of the fish passage design of the project has been reviewed by independent experts at time of construction upon request of GS. Design of the fish passage has been renewed upon recommendation of those experts and renewed design has been implemented by project owner. The report of expert has been submitted to GS during registration and 1st verification.

Relevant SDG Indicator/Safeguarding Principle	Principle 4.2.1 Impact on natural water patterns and flow
Data / Parameter	Water Quality and Quantity
Unit	-
Description	Impact of project activity and waste water comes from management activities
Source of data	Site assessment and interviews with locals
Value(s) applied	Amount of river water used for electricity generation and waste water due to management activities.
Measurement methods and procedures	Since the project is run-off- river type, the water used for the electricity generation is released back to river with in 50m and at least 1m depth of water will always be available in weir area. Waste water due to management activities is stored and transferred to municipal waste water channel.
Monitoring frequency	Once after construction completed for the impact of project activity. Annually for wastewater generated.
QA/QC procedures	-
Purpose of data	To monitor the project contribution to Principle 4.2.1
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	4.2.1 Erosion and/or water body stability
Data / Parameter	Soil condition/land restoration

Unit	-
Description	Land restoration measures implemented
Source of data	Through site assessment and documents for implementation of plan
Value(s) applied	-
Measurement methods and procedures	Restoration plans have been prepared and planned to be implemented in 2014 for Cemel I and II and in 2016 for Cemel –III (after construction is completed)
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	To monitor the project contribution to Principle 4.2.1
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	Principle 3.6.1: Labour Rights
Data / Parameter	Quality of Employment
Unit	Number of certificates issued/trainings provided
Description	Contribution to quality of employment by ensuring that the staff is trained and certified for the required positions
Source of data	Training Records (including H&S) & Other Certificates required by certain professions, if necessary
Value(s) applied	Some of the trainings & workshops that are given to the respective employees are: • H&S Training Record • First Aid
Measurement methods and procedures	All employees will attend trainings on first aid and health & safety. For positions that require specific skills (such as high voltage equipment) staff will either be trained or certified staff will be recruited.
Monitoring frequency	Annually
QA/QC procedures	The training programmes help increase the efficiency of the workforce and provides employees skilled at their job. This not only helps the company but to self-improvement of individual employees.
Purpose of data	To monitor the contribution to Principle 3.6.1
Additional comment	-

Relevant SDG Indicator/Safeguarding Principle	Principle 3.6.1: Labour Rights
Data / Parameter	Quantitative employment and income generation
Unit	Household income and annual minimum wage rate
Description	Ensuring that the staff receives their full salaries on time
Source of data	Review of payrolls and annual expenditures to be provided by the Project Owner
Value(s) applied	In construction phase 30 to 50 people will be employed for each HEPP. In operation phase, 18 people will be employed.

Measurement methods and procedures	The project owner is committed to ensuring that the staff receives their full salaries on time. Number of employees and the evidence for their wages being paid will be checked from the social security records, which will be provided by the Project Owner.
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	To monitor the contribution to Principle 3.6.1
Additional comment	-

C.1.1 Other elements of monitoring plan (if applicable)

Monitoring is a key procedure to verify the real and measurable emission reductions from the proposed project. To guarantee the proposed project's real, measurable and long-term GHG emission reductions, the monitoring plan is established.

Net electricity generation will be measured and recorded by both TEIAS and project owners for billing purposes therefore no new additional protocol will be needed for monitoring emission reduction. Power Plant Manager, will be responsible for the electricity generated, gathering all relevant data and keeping the records.

Generation data collected during crediting period will be submitted to Global Tan Energy 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 vintage from the project activity. These reports will be submitted to the duly authorized and appointed Designated Operational Entity 'DOE' before each verification period.

VER Team Members is expected to include the following staff of the HEPP:

Plant Manager: Responsibility for running the HEPP plant and compliance with VER monitoring plan

Accounting Manager: Responsible for keeping data about generation and consumption.

and

Global Tan Energy: Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

Installation of meter and data monitoring will be carried out according to the regulations by TEIAS. Two metering devices (one of them used as spare) will be used for monitoring the electricity generated by the power plant. Readings will be done using main metering devices and spare metering device will be used for comparison only. Data from metering devices will be recorded by TEIAS monthly(through remote reading). In addition to the two metering devices, generation of the HEPP can be cross checked from TEIAS – PMUM web site (<http://pmum.teias.gov.tr>) which is accessible using a password provided to electricity generation companies. ISVM (Electricity fed to the grid)and UECM(Electricity consumed from the grid) data given in PMUM records will be used for cross checking of emission reduction calculations.

All data will be kept for at least two years after the crediting period for QA/QC purposes.

Calibration of the metering devices will be made by TEIAS and sealed before the commissioning of the power plant. The meters will be calibrated by TEIAS when there is an inconsistency between two devices.

SECTION D Duration and crediting period

D.1 Duration of project

D.1.1 Start date of project

Start date of project activity is determined as 13/07/2011, date of construction subcontractor agreement.

D.1.2 Expected operational lifetime of project

The expected operational lifetime of the project is about 44 years 11 months as per the license issued. According to the lifetime of turbines which is estimated as 150,000 hours, lifetime of turbines will be about 41 years if operated at full time. Turbines will be renovated or replaced later. Project will be delivered to government authority at no cost at the end of license period.

D.1 GS Crediting period of the project/activity

D.2.1 Start date of the ongoing GS crediting period

01/07/2015

D.2.3 End date of the ongoing GS crediting period

The first crediting period is expected to start in 01/07/2015 in parallel with commissioning date of Cemel III.

D.2.3 Total length of the GS crediting periods

7 years

SECTION E Stacking of new assets

None

Appendix 1. Contact information of project participants

Organization name	ZEYNEP ENERJİ ÜRETİM SANAYİ VE TİCARET ANONİM ŞİRKETİ
Registration number with relevant authority	
Street/P.O. Box	Turan Güneş Bulvarı
Building	75/4
City	Çankaya Ankara
State/Region	N/A
Postcode	06550
Country	Turkey
Telephone	+90 312 490 98 38
Fax	+90 312 490 48 40
E-mail	murat@derinenerji.com
Website	-
Contact person	
Title	Manager
Salutation	Mr.
Last name	Dirsek
Middle name	-
First name	Murat
Department	Management
Mobile	-
Direct fax	+90 312 490 48 40
Direct tel.	+90 312 490 98 38
Personal e-mail	murat@derinenerji.com

Organization name	GTE Karbon Sürdürülebilir Enerji Eğitim Danışmanlık ve Ticaret A.Ş.
Registration number with relevant authority	-
Street/P.O. Box	2118. Cadde No:4
Building	Maidan C Blok 42
City	Ankara
State/Region	N/A
Postcode	06510
Country	Turkey
Telephone	+90 312 514 63 63
Fax	-
E-mail	gte@gte.com.tr
Website	www.gte.com.tr
Contact person	
Title	Director
Salutation	Mr.
Last name	Demirkol

Middle name	Kemal
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