



**Monitoring report form for CDM project activity**  
**(Version 07.0)**

*Complete this form in accordance with the instructions attached at the end of this form.*

**MONITORING REPORT**

|                                                                                                                                       |                                                                                                                                                                          |                                            |
|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| <b>Title of the project activity</b>                                                                                                  | Çamlıca 2 HEPP                                                                                                                                                           |                                            |
| <b>UNFCCC reference number of the project activity</b>                                                                                | GS1173                                                                                                                                                                   |                                            |
| <b>Version number of the PDD applicable to this monitoring report</b>                                                                 | 09                                                                                                                                                                       |                                            |
| <b>Version number of this monitoring report</b>                                                                                       | 07 <del>6</del>                                                                                                                                                          |                                            |
| <b>Completion date of this monitoring report</b>                                                                                      | <u>18/05/2020</u>                                                                                                                                                        |                                            |
| <b>Monitoring period number</b>                                                                                                       | 2                                                                                                                                                                        |                                            |
| <b>Duration of this monitoring period</b>                                                                                             | 27 months between<br>01/03/2017- 31/05/2019                                                                                                                              |                                            |
| <b>Monitoring report number for this monitoring period</b>                                                                            | 06                                                                                                                                                                       |                                            |
| <b>Project participants</b>                                                                                                           | 1-Derin Enerji Üretim San. Ve Tic. AŞ (Project Owner)<br>2-GTE CARBON (Project Developer)                                                                                |                                            |
| <b>Host Party</b>                                                                                                                     | Turkey                                                                                                                                                                   |                                            |
| <b>Applied methodologies and standardized baselines</b>                                                                               | Methodology: ACM0002, version 13.0.0 "Consolidated baseline methodology for grid connected electricity generation from renewable sources"                                |                                            |
| <b>Sectoral scopes</b>                                                                                                                | Sectoral Scope 1 "Energy Industry – Renewable Sources "                                                                                                                  |                                            |
| <b>Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period</b> | <b>Amount achieved before 1 January 2013</b>                                                                                                                             | <b>Amount achieved from 1 January 2013</b> |
|                                                                                                                                       | 0                                                                                                                                                                        | 41,352 tCO <sub>2</sub>                    |
| <b>Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD</b>    | According to PDD, 49,436 tons CO <sub>2</sub> annually and 111,333 tons CO <sub>2</sub> emission reduction is expected for the 27 <sup>th</sup> months monitoring period |                                            |

## SECTION A. Description of project activity

### A.1. General description of project activity

Çamlıca II Hydro Electrical Power Plant (HEPP) has installed capacity of 17.58 MWe and built as run-of-river type project on river Zamanti. The main principle behind the project design is to make use of the elevation difference of 69m which is approximately 1500m away from the Çamlıca Village.

Annual expected generation in license was given as 89.558 GWh/y and based on this figure, about 49,436 tCO<sub>2</sub>e emission reduction was estimated. On the other hand, net generation has been realized as 74,913.833 MWh, and 41,352 tCO<sub>2</sub>e emission reduction has been realized during monitoring period. The Electricity generated within the project boundaries were transferred to the national grid via Yamanlı Substation.

Prior to project implementation, there exists only one hydro power plant which is Çamlıca I HEPP, located upstream. The project is utilizing tail water from Çamlıca I Regulator and HEPP. Çamlıca I HEPP has the installed capacity of 84MW and it has been operational since 1998. Water released from Çamlıca I HEPP transferred to the energy transmission channel by 1500m long and 50.00 m<sup>3</sup>/sec capacity water transfer channel. At the 1347.50 m, the channel connected to the surge tank by free-flow through 10,485 m tunnelchamber and at the end of surge chamber water transferred to penstock, passing through turbines at a power of 3x28 MW. The penstock continued until the generation area. 30 m<sup>3</sup>/sec flow enter the plant and the tail water transferred back to the river Zamanti.

Used turbine type is Francis and total installed power is 17.58 MWe. Total number of units is 3 x (5.96 MWm/5.86MWe). Turbine gross elevation and net elevation values are 69 and 66 meters, respectively.

Main purpose of the project is to produce clean, sustainable and environment-friendly energy. Since the project activity involves generating electricity from renewable natural resources, the risks it bears were considerably low and the project was designed in the most efficient way possible while keeping the local sources and nature unharmed. All the necessary and legally mandatory documents were obtained and environmental impact assessment proved that the project has not been posing any threats for the nature.

Additionally, the project was expected to provide an impetus for the economic activities in the nearby regions, while increasing the awareness about environmental issues. The project was also directly contributed to local area by creating job opportunities and improving know-how through trainings and site visits.

On the macro scale, project activities were result in expanding the share of renewables in the national energy pool and reduced the dependency on the imports which immediately translates into saving currency.

Main milestones of the project are given in table below.

| Milestone                              | Date       |
|----------------------------------------|------------|
| Water Right Utilization Agreement      | 03/01/2011 |
| License Issuance                       | 09/02/2011 |
| EIA Exemption Letter                   | 21/02/2011 |
| Carbon Certification Proposal          | 08/06/2011 |
| Project Consultancy Services Agreement | 12/07/2011 |
| Bank Loan Agreement                    | 25/07/2011 |
| Construction Agreement                 | 08/08/2011 |
| Carbon Certification Agreement         | 20/10/2011 |
| LSC Meeting                            | 26/01/2012 |
| Equipment Agreement                    | 23/02/2012 |
| Start of Construction*                 | 01/05/2012 |
| State Hydraulic Works Project Approval | 27/12/2012 |
| Ecosystem Assessment Report            | 24/04/2013 |
| Revised Exemption from EIA Certificate | 20/05/2013 |
| System Connection Agreement            | 07/08/2013 |
| Energy Transmission Line Approval      | 02/09/2013 |

|                       |                         |
|-----------------------|-------------------------|
| Commissioning Date    | 02/05/2014              |
| 1st Monitoring Period | 01/01/2015 – 28/02/2017 |
| 2nd Monitoring Period | 01/03/2017 – 31/05/2019 |

**Table 1. Milestones for Camlica II HEPP**

\*Project start date as per GS Toolkit and Requirements v2.1

Technical characteristics of Çamlıca II HEPP have been summarized in table below.

Specifications for the built tunnel are as follows:

|                                    |                         |
|------------------------------------|-------------------------|
| Tunnel length                      | 1500 m                  |
| Progress rate                      | 1.25m/shift             |
| Average drilling rate              | 6 cm/d                  |
| Time allocated for drilling        | 40% shift (168d)        |
| Cartridge diameter                 | 2.5 cm                  |
| Geological formation               | Limestone               |
| Air Conditioning                   | Ventilation             |
| Average length of sewage pit       | 1.40 m                  |
| Cross-sectional area of the tunnel | 7.5 m <sup>2</sup>      |
| Holes per unit drilling area       | 2.2/m <sup>2</sup>      |
| Total holes                        | 13                      |
| Unit amount of explosives          | 1.125 kg/m <sup>3</sup> |
| Ventilation duration               | 15 min                  |
| Explosives per hole                | 0.65 kg/hole            |

**Table 2: Tunnel Specifications**

During the construction approximately 100,000 m<sup>3</sup> of excavation is processed in two separate grinding units. All of the obtained materials are either be used in construction or stockpiled in appropriate storage areas. These areas are shown in the detailed project layout map.

The energy from the power house is transmitted to Camlica I substation by using a 154.00 kV 1 x 477.00 MCM line. Technical details of each unit that are used in the project are given in the project introductory document.

Specifications for the used turbines are as follows:

|                       |                        |
|-----------------------|------------------------|
| Turbine Type          | Francis                |
| Total Installed Power | 17.58 MWe              |
| Total Number of Units | 3 x (5.96 MWm/5.86MWe) |
| Gross Elevation       | 69m                    |
| Maximum Net Elevation | 66m                    |
| Minimum Net Elevation | 66m                    |

**Table 3: Turbine Specifications**

## A.2. Location of project activity

Nearest settlement to the project site is Çamlıca village within the boundaries of Yahyalı district.

|                                |                                                            |
|--------------------------------|------------------------------------------------------------|
| Host Party                     | Turkey                                                     |
| Region/State/Province          | Central Anatolia within the boundaries of Kayseri province |
| City/Town/Community            | Yahyalı district                                           |
| Physical/Geographical location | 120 km away to the south of Kayseri city centrum           |



Figure 1: Çamlıca II HEPP Project Site



Figure 2: Çamlıca II HEPP Project Site

Related coordinates are given in Table below.

|                     | Longitude               | Latitude                |
|---------------------|-------------------------|-------------------------|
| Weir                | E 35.4912182            | N 37.9034788            |
| Tunnel Inlet-Outlet | 35.4938434 - 35.4909861 | 37.9179036 - 37.9040153 |
| Forebay             | 37.9045992 - 37.9045096 | 35.4910740 - 35.4910483 |

Table 4. Project site weir and main structures coordinates

**A.3. Parties and project participants**

| Parties involved | Project participants                                                  | Indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Turkey (Host)    | Derin Enerji Üretim San. ve Tic. A.Ş. (Project Owner- Private Entity) | Turkey (Host)                                                                          |

**A.4. References to applied methodologies and standardized baselines**

The UNFCCC approved simplified baseline and monitoring ACM0002, version 13.0.0<sup>1</sup> valid from 11/05/2012 was applied for the project activity.

ACM0002 refers to the following tools:

- “Tool for the demonstration and assessment of additionality”, Version 07.0.0<sup>2</sup>, and,
- “Tool to calculate the emission factor for an electricity system”, Version 03.0.0<sup>3</sup>

**A.5. Crediting period type and duration**

This crediting period is the first crediting period. Project uses renewable crediting period. Crediting period of the project is initially planned as 7 years between 02/05/2014 and 01/05/2021. Although provisional acceptance of plant has been completed on 02/05/2014, due to completion of missing works during start-up phase, actual full performance commissioning has taken place by end of 2014 and no significant generation has occurred in 2014. Therefore, crediting period has been postponed to 2015. So, crediting period of the project is 7 years between 01/01/2015 and 31/12/2021

**SECTION B. Implementation of project activity****B.1. Description of implemented project activity**

The proposed project is located in central Anatolia within the boundaries of Kayseri province. Nearest settlement to the project site is Çamlıca village within the boundaries of Yahyalı district. Total installed power of the facility has been 17.58 MWe.

Project has started operation in 02/05/2014.

**B.2. Post-registration changes****B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents**

NA

**B.2.2. Corrections**

NA

<sup>1</sup> <http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT>

<sup>2</sup> [http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v7.0.0.pdf/history\\_view](http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v7.0.0.pdf/history_view)

<sup>3</sup> [http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v3.0.0.pdf/history\\_view](http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v3.0.0.pdf/history_view)

**B.2.3. Changes to the start date of the crediting period**

Provisional acceptance of plant has been completed on 02/05/2014 however, due to completion of missing works during start up phase, actual commissioning has taken place by end of 2014 and no significant generation has occurred in 2014. Therefore, crediting period has been postponed to 2015. Thus, start of crediting period has been changed from 02/05/2014 to 01/01/2015.

**B.2.4. Inclusion of monitoring plan**

>>

**B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents**

>>

**B.2.6. Changes to project design**

NA

**B.2.7. Changes specific to afforestation or reforestation project activity**

NA

**SECTION C. Description of monitoring system**

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. Project has been registered as a GS-VER project. In addition to the parameters monitored in PDD, there exist sustainable development indicators as given in GS passport document.

In order to demonstrate the emission reduction, only the required data is the net electricity delivered to the grid by the project activity.

Net electricity generation records were gathered from EPIAS which are also be used for billing purposes. Therefore, no new additional protocol was needed for monitoring emission reduction. Power Plant Manager was responsible for the electricity generated, gathering all relevant data and keeping the records.

Generation data collected during crediting period has been submitted to GTE Carbon who was responsible for calculating the emission reduction subject for verification. Generation data was used to prepare monitoring reports which is used to determine the vintage from the project activity. These reports were submitted to the duly authorized and appointed Designated Operational Entity (DOE) during each verification period.

Verification Team is composed from;

**Plant Manager:** Overall responsibility of compliance with VER monitoring plan

**Electrical Engineer:** Responsible for day to day running of plant, recording and monitoring of relevant data and periodic reporting

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

**GTE Carbon:** Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

Installation of metering devices and data monitoring were carried out according to the regulations and control process of TEIAS. Two metering devices (one of them used as spare) were used for monitoring the electricity generated by the power plant. Readings were done using main metering device and spare metering device was 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 – EPIAS web site 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 EPIAS 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 is made on 03/05/2014 and sealed before the commissioning of the power plant. According to the related regulation on calibration of metering devices, next calibration will be done in 2024 and so there is no need to provide any calibration study in this monitoring period. The maintenance and test study on metering devices are done and controlled by TEIAS yearly and when there is an inconsistency between two devices (main and spare one).

The lake area at maximum height has been defined in the project documents. Although it is not possible to exceed maximum lake area, as the excess water can spill over the weir, the water level and maps of reservoir area were used to monitor the maximum area covered.

The monitoring system organization chart is shown in figure below, in which the authority and responsibility of project management are defined.

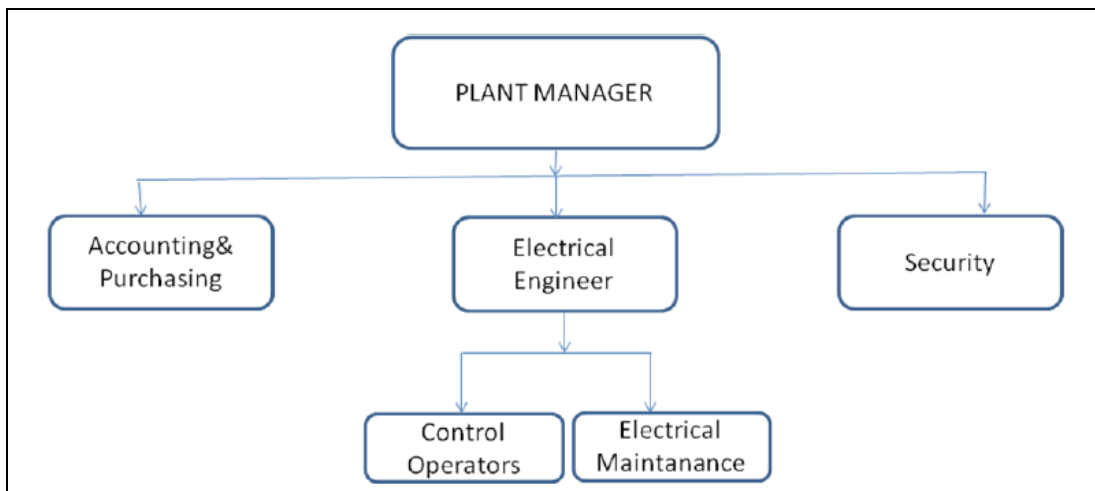




Figure 3. Operational structure of Çamlıca II HEPP

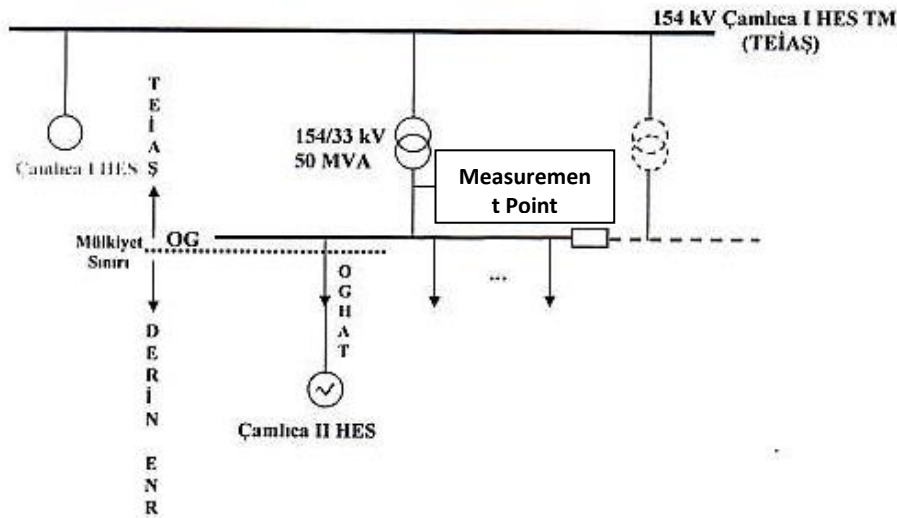


Figure 4. Grid connection point for Çamlıca II HEPP

## SECTION D. Data and parameters

### D.1. Data and parameters fixed ex ante

|                           |                                                                                                                                                                                                                                         |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:         | EGy                                                                                                                                                                                                                                     |
| 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 :          | 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 <sup>4</sup><br>Net generation and imported electricity <sup>5,6</sup> |
| Value(s) applied:         | 157,706.6 in 2008<br>151,144.7 in 2009<br>150,894,2 in 2010                                                                                                                                                                             |
| Purpose of data/parameter | Data used for emission reduction calculation (for calculation of OM, Net- to-Gross electricity ratio and share of low-cost must-run sources)                                                                                            |
| Additional comment        | -                                                                                                                                                                                                                                       |

<sup>4</sup> [http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kgucunkullan%C4%B1m\(13-21\)/13.xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kgucunkullan%C4%B1m(13-21)/13.xls)

<sup>5</sup> [http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim\(22-45\)/33\(84-11\).xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls)

<sup>6</sup> [http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim\(22-45\)/33\(84-11\).xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls)



|                                                             |                                                                                                                                                                                                                      |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter</b>                                     | <b>EF<sub>grid,CM,y</sub></b>                                                                                                                                                                                        |
| <b>Unit</b>                                                 | tCO <sub>2</sub> /MWh                                                                                                                                                                                                |
| <b>Description</b>                                          | Combined margin CO <sub>2</sub> emission factor for grid connected power generation in year y calculated using the latest available version of the “Tool to calculate the emission factor for an electricity system” |
| <b>Source of data</b>                                       | As per the “Tool to calculate the emission factor for an electricity system”                                                                                                                                         |
| <b>Value(s) applied</b>                                     | 0.552                                                                                                                                                                                                                |
| <b>Choice of data or Measurement methods and procedures</b> | As per the “Tool to calculate the emission factor for an electricity system”                                                                                                                                         |
| <b>Purpose of data/parameter</b>                            |                                                                                                                                                                                                                      |
| <b>Additional comment</b>                                   | -                                                                                                                                                                                                                    |

| <b>Data/parameter:</b>                                      | <b>EF<sub>CO<sub>2</sub>, i, y i</sub></b>                                                                                                                                                                                                                                                                                                                                       |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------|------|------|---------|------|----------|------|--------|------|-----|------|--------|------|-------------|------|
| <b>Unit</b>                                                 | tCO <sub>2</sub> /TJ                                                                                                                                                                                                                                                                                                                                                             |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| <b>Description</b>                                          | CO <sub>2</sub> emission factor of fossil fuel type “i” in year “y”                                                                                                                                                                                                                                                                                                              |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| <b>Source of data</b>                                       | -For EF of fossil fuels, IPCC values at the lower limit have been used.                                                                                                                                                                                                                                                                                                          |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| <b>Value(s) applied)</b>                                    | <table> <tr> <th><b>Fuel Source</b></th><th><b>EF(tCO<sub>2</sub>/Tj)</b></th></tr> <tr> <td>Coal</td><td>89.5</td></tr> <tr> <td>Lignite</td><td>90.9</td></tr> <tr> <td>Fuel Oil</td><td>75.5</td></tr> <tr> <td>Diesel</td><td>72.6</td></tr> <tr> <td>LPG</td><td>61.6</td></tr> <tr> <td>Naphta</td><td>69.3</td></tr> <tr> <td>Natural Gas</td><td>54.3</td></tr> </table> | <b>Fuel Source</b> | <b>EF(tCO<sub>2</sub>/Tj)</b> | Coal | 89.5 | Lignite | 90.9 | Fuel Oil | 75.5 | Diesel | 72.6 | LPG | 61.6 | Naphta | 69.3 | Natural Gas | 54.3 |
| <b>Fuel Source</b>                                          | <b>EF(tCO<sub>2</sub>/Tj)</b>                                                                                                                                                                                                                                                                                                                                                    |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| Coal                                                        | 89.5                                                                                                                                                                                                                                                                                                                                                                             |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| Lignite                                                     | 90.9                                                                                                                                                                                                                                                                                                                                                                             |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| Fuel Oil                                                    | 75.5                                                                                                                                                                                                                                                                                                                                                                             |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| Diesel                                                      | 72.6                                                                                                                                                                                                                                                                                                                                                                             |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| LPG                                                         | 61.6                                                                                                                                                                                                                                                                                                                                                                             |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| Naphta                                                      | 69.3                                                                                                                                                                                                                                                                                                                                                                             |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| Natural Gas                                                 | 54.3                                                                                                                                                                                                                                                                                                                                                                             |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| <b>Choice of data or measurement methods and procedures</b> | 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.                                                           |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| <b>Purpose of data/parameter</b>                            | EF calculations                                                                                                                                                                                                                                                                                                                                                                  |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| <b>Additional comments</b>                                  | -                                                                                                                                                                                                                                                                                                                                                                                |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |

| <b>Data / Parameter Unit</b>                                | η <sub>m,y</sub>                                                                                                                                                                                                                                                                                                                                                                                                |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------|-------------|-------|----------------|-------|-----------------|-------|---------------|-------|------------|-------|----------------|-------|--------------------|-------|
| <b>Description Source of data</b>                           | Average net energy conversion efficiency of power unit m or k in year y<br>Appendix 1. Default efficiency factors for power plants of Tool to calculate the emission factor for an electricity system Version 03.0.0                                                                                                                                                                                            |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>Value(s) applied</b>                                     | <table> <tr> <th></th><th>Generation Efficiency</th></tr> <tr> <td><b>Coal</b></td><td>39.0%</td></tr> <tr> <td><b>Lignite</b></td><td>39.0%</td></tr> <tr> <td><b>Fuel Oil</b></td><td>39.5%</td></tr> <tr> <td><b>Diesel</b></td><td>39.5%</td></tr> <tr> <td><b>LPG</b></td><td>39.5%</td></tr> <tr> <td><b>Naphtha</b></td><td>39.5%</td></tr> <tr> <td><b>Natural Gas</b></td><td>60.0%</td></tr> </table> |  | Generation Efficiency | <b>Coal</b> | 39.0% | <b>Lignite</b> | 39.0% | <b>Fuel Oil</b> | 39.5% | <b>Diesel</b> | 39.5% | <b>LPG</b> | 39.5% | <b>Naphtha</b> | 39.5% | <b>Natural Gas</b> | 60.0% |
|                                                             | Generation Efficiency                                                                                                                                                                                                                                                                                                                                                                                           |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>Coal</b>                                                 | 39.0%                                                                                                                                                                                                                                                                                                                                                                                                           |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>Lignite</b>                                              | 39.0%                                                                                                                                                                                                                                                                                                                                                                                                           |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>Fuel Oil</b>                                             | 39.5%                                                                                                                                                                                                                                                                                                                                                                                                           |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>Diesel</b>                                               | 39.5%                                                                                                                                                                                                                                                                                                                                                                                                           |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>LPG</b>                                                  | 39.5%                                                                                                                                                                                                                                                                                                                                                                                                           |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>Naphtha</b>                                              | 39.5%                                                                                                                                                                                                                                                                                                                                                                                                           |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>Natural Gas</b>                                          | 60.0%                                                                                                                                                                                                                                                                                                                                                                                                           |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>Choice of data or Measurement methods and procedures</b> | Default values are used as a conservative approach.                                                                                                                                                                                                                                                                                                                                                             |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |
| <b>Purpose of data/parameter</b>                            | Data is used for OM calculation                                                                                                                                                                                                                                                                                                                                                                                 |  |                       |             |       |                |       |                 |       |               |       |            |       |                |       |                    |       |

|                       |                                                                                                                      |
|-----------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Data/parameter</b> | <b>FC<sub>i,y</sub></b>                                                                                              |
| <b>Unit</b>           | Tons or 1000 m <sup>3</sup> for gases                                                                                |
| <b>Description</b>    | Amount of fuels consumed by thermal power plants for electricity generation in terms of fossil fuel type i in year y |
| <b>Source of data</b> | TEIAS Statistics <sup>7,8</sup>                                                                                      |

<sup>7</sup> <http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls>

<sup>8</sup> <http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/49.xls>

| Value(s) applied)                                           | FC <sub>i,y</sub> unit [Ton, except for Natural Gas (NG) (1000 m )] |            |            |            |             |
|-------------------------------------------------------------|---------------------------------------------------------------------|------------|------------|------------|-------------|
|                                                             | Fuel Type                                                           | 2009       | 2010       | 2011       | Total       |
|                                                             | Hard Coal                                                           | 6,621,177  | 7,419,703  | 10,574,434 | 24,615,314  |
|                                                             | Lignite                                                             | 63,620,518 | 56,689,392 | 61,507,310 | 181,817,220 |
|                                                             | Fuel Oil                                                            | 1,594,321  | 891,782    | 531,608    | 3,017,711   |
|                                                             | Diesel Oil                                                          | 180,857    | 20,354     | 15,047     | 216,258     |
|                                                             | LPG                                                                 | 111        | 0          | 0          | 111         |
|                                                             | Naphtha                                                             | 8,077      | 13,140     | 0          | 21,217      |
|                                                             | Natural Gas                                                         | 17,034,548 | 20,457,793 | 21,607,635 | 59,099,976  |
|                                                             |                                                                     |            |            |            |             |
| <b>Choice of data or measurement methods and procedures</b> | Data from Grid Operator has been used                               |            |            |            |             |
| <b>Purpose of data/parameter</b>                            | Data is used for OM calculation                                     |            |            |            |             |
| <b>Additional comments</b>                                  | -                                                                   |            |            |            |             |

|                                                             |                                                                                                                             |                                                      |  |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|--|
| <b>Data/parameter:</b>                                      | NCV <sub>i,y</sub>                                                                                                          |                                                      |  |
| <b>Unit</b>                                                 | Tj/kt                                                                                                                       |                                                      |  |
| <b>Description</b>                                          | Net Calorific Values of Fuel combusted in power plants.                                                                     |                                                      |  |
| <b>Source of data</b>                                       | TEIAS statistics <sup>9</sup>                                                                                               |                                                      |  |
| <b>Value(s) applied)</b>                                    |                                                                                                                             | <b>Weighted Average for years 2009 , 2010 , 2011</b> |  |
|                                                             | Hard Coal                                                                                                                   | 22.49                                                |  |
|                                                             | Lignite                                                                                                                     | 6.94                                                 |  |
|                                                             | Fuel Oil                                                                                                                    | 40.25                                                |  |
|                                                             | Diesel Oil                                                                                                                  | 42.49                                                |  |
|                                                             | LPG                                                                                                                         | 46.47                                                |  |
|                                                             | Naphta                                                                                                                      | 37.36                                                |  |
|                                                             | Natural Gas                                                                                                                 | 37.22                                                |  |
| <b>Choice of data or measurement methods and procedures</b> | Data has been calculated from Grid Operator's (TEIAS) statistics. Consumed & obtained energy to determine NCV of each type. |                                                      |  |

<sup>9</sup><http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls>

|                                  |                                     |
|----------------------------------|-------------------------------------|
| <b>Purpose of data/parameter</b> | Data used for OM and BM calculation |
| <b>Additional comments</b>       | -                                   |

|                                                             |                                                                                              |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>Cap<sub>BL</sub></b>                                     | <b>Cap BL</b>                                                                                |
| <b>Unit</b>                                                 | W                                                                                            |
| <b>Description</b>                                          | Installed capacity of the hydro power plant after the implementation of the project activity |
| <b>Source of data</b>                                       | Project site                                                                                 |
| <b>Value(s) applied</b>                                     |                                                                                              |
| <b>Choice of data or Measurement methods and procedures</b> | As the hydro power plant is new this value is 0                                              |
| <b>Purpose of data/parameter</b>                            |                                                                                              |
| <b>Additional comment</b>                                   | -                                                                                            |

|                                                             |                                                                                                                                                               |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data/Parameter</b>                                       | <b>ABL</b>                                                                                                                                                    |
| <b>Unit</b>                                                 | m <sup>2</sup>                                                                                                                                                |
| <b>Description</b>                                          | 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 |
| <b>Source of data</b>                                       | Project Site                                                                                                                                                  |
| <b>Value(s) applied</b>                                     | 0                                                                                                                                                             |
| <b>Choice of data or Measurement methods and procedures</b> | As the hydro power plant is new this value is 0                                                                                                               |
| <b>Purpose of data/parameter</b>                            |                                                                                                                                                               |
| <b>Additional comment</b>                                   | -                                                                                                                                                             |

## D.2. Data and parameters monitored

|                         |                                                                              |
|-------------------------|------------------------------------------------------------------------------|
| <b>Data / Parameter</b> | <b>EG<sub>facility, y</sub></b>                                              |
| <b>Unit</b>             | MWh/y                                                                        |
| <b>Description</b>      | Net Electricity generated and delivered to the grid by the project in year y |

| <b>Measured/<br/>Calculated /<br/>Default:</b>          | Measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |                        |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------------|----------------------------|----------------------|-------------------------------|------------|---------|------------|-------------|------------|--------|------------|--------------------------|------------|--------|-------------|--------------|------------|---------|------------|
| <b>Source of data</b>                                   | Records from the metering devices used in the power plant are used to calculate the annual generation of energy. EPIAS records are used as a cross- check both for generation and internal consumption.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                            |                        |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>Value(s) of monitored parameter:</b>                 | <p>Estimated annual generation forming the basis for emission reduction calculation is 89,558 MWh/y. During monitoring period, generation has been realized as 74,913.833 MWh for 27 months. Monthly and annual generation records have been presented in the excel worksheet for verification calculations.</p> <table border="1"> <thead> <tr> <th></th><th>Gross Generation (MWh)</th><th>Internal Consumption (MWh)</th><th>Net Generation (MWh)</th></tr> </thead> <tbody> <tr> <td><b>2017<br/>(01/03-31/12)</b></td><td>16,405.563</td><td>79,715</td><td>16,325.848</td></tr> <tr> <td><b>2018</b></td><td>22,934.117</td><td>92,873</td><td>22,841.244</td></tr> <tr> <td><b>2019(01/01-31/05)</b></td><td>35,759.411</td><td>12,670</td><td>35,746 .741</td></tr> <tr> <td><b>Total</b></td><td>75,099.091</td><td>185,258</td><td>74,913.833</td></tr> </tbody> </table> |                            | Gross Generation (MWh) | Internal Consumption (MWh) | Net Generation (MWh) | <b>2017<br/>(01/03-31/12)</b> | 16,405.563 | 79,715  | 16,325.848 | <b>2018</b> | 22,934.117 | 92,873 | 22,841.244 | <b>2019(01/01-31/05)</b> | 35,759.411 | 12,670 | 35,746 .741 | <b>Total</b> | 75,099.091 | 185,258 | 74,913.833 |
|                                                         | Gross Generation (MWh)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Internal Consumption (MWh) | Net Generation (MWh)   |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>2017<br/>(01/03-31/12)</b>                           | 16,405.563                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 79,715                     | 16,325.848             |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>2018</b>                                             | 22,934.117                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 92,873                     | 22,841.244             |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>2019(01/01-31/05)</b>                                | 35,759.411                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 12,670                     | 35,746 .741            |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>Total</b>                                            | 75,099.091                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 185,258                    | 74,913.833             |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>Monitoring equipment:</b>                            | <p>Specifications of the metering devices are as follows:</p> <table border="1"> <thead> <tr> <th>Manufacturer</th><th>Device Model</th><th>Serial Number</th><th>Last Calibration</th><th>Precision</th></tr> </thead> <tbody> <tr> <td>EMH</td><td>LZQJ-XC</td><td>4241381</td><td rowspan="2">03.05.2014</td><td>&lt; 0.05 %</td></tr> <tr> <td>EMH</td><td>LZQJ-XC</td><td>4241382</td><td>&lt; 0.05 %</td></tr> </tbody> </table> <p>Calibration tests were performed during this monitoring period on 03.05.2014.</p>                                                                                                                                                                                                                                                                                                                                                         | Manufacturer               | Device Model           | Serial Number              | Last Calibration     | Precision                     | EMH        | LZQJ-XC | 4241381    | 03.05.2014  | < 0.05 %   | EMH    | LZQJ-XC    | 4241382                  | < 0.05 %   |        |             |              |            |         |            |
| Manufacturer                                            | Device Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Serial Number              | Last Calibration       | Precision                  |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| EMH                                                     | LZQJ-XC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 4241381                    | 03.05.2014             | < 0.05 %                   |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| EMH                                                     | LZQJ-XC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 4241382                    |                        | < 0.05 %                   |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>Measuring/<br/>Reading/<br/>Recording frequency:</b> | Continuous measuring and monthly recording                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            |                        |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>Calculation method (if applicable):</b>              | Generation data is recorded by two metering devices continuously. These records are providing the data for the monthly invoicing to TEIAS. Generation is recorded via remote reading system. This record is form the basis for monthly invoicing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                            |                        |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>QA/QC procedures</b>                                 | Two calibrated ammeters back up each other. Maintenance and calibration of the metering devices are 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 is done before waiting for the periodical maintenance. The meters 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 ( <a href="http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44">http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44</a> ) As per the regulations, calibration is valid for 10 years <sup>10</sup> . Meters used in Çamıca II Hepp are 0.2S class <sup>11</sup>                                                                                                      |                            |                        |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>Purpose of data</b>                                  | Emission Reduction calculations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                            |                        |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |
| <b>Additional comment</b>                               | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                            |                        |                            |                      |                               |            |         |            |             |            |        |            |                          |            |        |             |              |            |         |            |

|                         |              |
|-------------------------|--------------|
| <b>Data / Parameter</b> | <b>CapPJ</b> |
| <b>Unit</b>             | W            |

<sup>10</sup> <http://www.resmigazete.gov.tr/eskiler/2008/08/20080807-3.htm>

<sup>11</sup> Initial test protocol for meters

|                                                 |                                                                                              |
|-------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>Description</b>                              | Installed capacity of the hydro power plant after the implementation of the project activity |
| <b>Measured/ Calculated / Default:</b>          | Measured                                                                                     |
| <b>Source of data</b>                           | Project license                                                                              |
| <b>Value(s) of monitored parameter:</b>         | 17,580,000                                                                                   |
| <b>Monitoring equipment : procedure</b>         | Checking project documents and equipment labels                                              |
| <b>Measuring/ Reading/ Recording frequency:</b> | Yearly                                                                                       |
| <b>Calculation method (if applicable):</b>      | -                                                                                            |
| <b>QA/QC procedures</b>                         | -                                                                                            |
| <b>Purpose of data</b>                          | Ensuring validity of project documentation                                                   |
| <b>Additional</b>                               | -                                                                                            |

|                                                 |                                                                                                                                                                                                                                                         |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter</b>                         | <b>APJ</b>                                                                                                                                                                                                                                              |
| <b>Unit</b>                                     | m <sup>2</sup>                                                                                                                                                                                                                                          |
| <b>Description</b>                              | Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full                                                                                                                |
| <b>Measured/ Calculated / Default:</b>          | Data from Project Site                                                                                                                                                                                                                                  |
| <b>Source of data</b>                           | Project site and Google Earth photos                                                                                                                                                                                                                    |
| <b>Value(s) of monitored parameter:</b>         | Area of the reservoir has been calculated as 6,776 m <sup>2</sup> . of which the most of them is already river bed. The level of water is kept stable which enables water to pass through the fish passage. The depth changes between 0.5 and 2 meters. |
| <b>Monitoring equipment: procedures</b>         | N/A                                                                                                                                                                                                                                                     |
| <b>Measuring/ Reading/ Recording frequency:</b> | Yearly                                                                                                                                                                                                                                                  |
| <b>Calculation method (if applicable):</b>      | N/A                                                                                                                                                                                                                                                     |
| <b>QA/QC procedures</b>                         | -                                                                                                                                                                                                                                                       |
| <b>Purpose of data</b>                          | Maximum area is already calculated in feasibility report and considered in calculations. Annual measurements are not expected to be higher than this value.                                                                                             |

Additional  
comment

-

**D.3. Implementation of sampling plan**

NA

**SECTION E. Calculation of emission reductions or net anthropogenic removals****E.1. Calculation of baseline emissions or baseline net removals**

The *ex-ante* emission reductions ( $ER_y$ ) are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

$ER_y$  = Emission reductions in year  $y$  ( $tCO_2$ )

$BE_y$  = Baseline emissions in year  $y$  ( $tCO_2$ )

$PE_y$  = Project Emissions in year  $y$  ( $tCO_2$ )

$LE_y$  = Leakage emissions in year  $y$  ( $tCO_2$ )

**Baseline emissions**

Baseline emission is calculated according to the formula

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

Where:

$EG_y$  = Net electricity delivered to the grid by the project activity in year  $y$  excluding transmission losses of the grid.

$EF_y$  = Emission factor calculated according to selected methodology. Emission factor has been calculated *ex-ante* in PDD which is also used in calculating the baseline emissions. EF value used is  $0.552 \text{ tCO}_2/\text{MWh}$

As it can be seen detail in excel spread sheet used for calculations;

|                               | Gross<br>Generation<br>(MWh) | Internal<br>Consumption<br>(MWh) | Net Generation<br>(MWh) |
|-------------------------------|------------------------------|----------------------------------|-------------------------|
| <b>2017<br/>(01/03-31/12)</b> | 16,405.563                   | 79,715                           | 16,325.848              |
| <b>2018</b>                   | 22,934.117                   | 92,873                           | 22,841.244              |
| <b>2019(01/01-31/05)</b>      | 35,759.411                   | 12,670                           | 35,746.741              |
| <b>Total</b>                  | 75,099.091                   | 185,258                          | 74,913.833              |



Realized baseline emissions are calculated as follows:

$$EG_y = 74,913.833 \text{ MWh}$$

$$EF_{\text{grid,CM,y}} = 0.552 \text{ tCO}_2/\text{MWh}$$

$$BE_y = (74,913.833 \text{ MWh}) \times (0.552 \text{ tCO}_2/\text{MWh}) = 41,352 \text{ tCO}_2\text{e}$$

Vintage wise breakdown is ;

|                                                          |               |
|----------------------------------------------------------|---------------|
| Net Emission Reduction in 2017                           | 9,012         |
| Net Emission Reduction in 2018                           | 12,608        |
| Net Emission Reduction in 2019                           | 19,732        |
| <b>Total Emission Reduction during Monitoring Period</b> | <b>41,352</b> |

## E.2. Calculation of project emissions or actual net removals

The proposed project activity involves the generation of electricity by a hydroelectric power plant which has power density higher than 10W/m<sup>2</sup> therefore emissions from reservoir is ignored as per the applied methodology.

The UNFCCC approved baseline and monitoring methodology ACM0002, version 13.0.0 valid from 11/05/2012 was applied for the project activity.

ACM0002 refers to the following tools:

- “Tool for the demonstration and assessment of additionality”, Version 07.0.0, and,
- “Tool to calculate the emission factor for an electricity system”, Version 3.0

The project activity involves the generation of electricity by a hydro power plant. As per the methodology applied, reservoir emissions are considered as below;

Reservoir emissions of the project activity is neglected since the power density is higher than 10W/m<sup>2</sup>. Details of the PD calculation are below.

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

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

Where:

- PD = Power density of the project activity (W/m<sup>2</sup>)
- Cap<sub>PJ</sub> = Installed capacity of the hydro power plant after the implementation of the project activity (W)
- Cap<sub>BL</sub> = 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<sub>PJ</sub> = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m<sup>2</sup>)
- A<sub>BL</sub> = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m<sup>2</sup>). For new reservoirs, this value is zero.

Although about half of the reservoir area is already river bed, A<sub>BL</sub> has been assumed as zero. A<sub>PJ</sub> had been estimated as ~~10091.0166776~~ m<sup>2</sup> in the as per the reservoir map

For proposed project HEPP,

$$Cap_{PJ} = 17,580,000 \text{ We}$$

$$Cap_{BL} = 0.0 \text{ W}$$

$$A_{PJ} = 6776 \text{ } \cancel{10091.016} (m^2) \cancel{12}$$

$$A_{BL} = 0.0 (m^2)$$

Therefore PD is calculated as ;

$$PD = \frac{17580000 - 0}{\cancel{10091.016} 6776 - 0}$$

$$PD = \sim \cancel{1742} \text{ } \cancel{2594} \text{ W/m}^2$$

Since  $\cancel{2594} \text{ } \cancel{1742} \text{ W/m}^2$  is far greater than  $10 \text{ W/m}^2$ , project emissions are considered 0.

### E.3. Calculation of leakage emissions

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected

Also the energy generating equipment is not transferred from or to another activity. Therefore leakage is considered as "0".

As a result: Total Emission Reduction is;

$$LE_y = 0$$

$$ER_y = BE_y$$

### E.4. Calculation of emission reductions or net anthropogenic removals

|  | Baseline GHG emissions or baseline net GHG removals (t CO <sub>2</sub> e) | Project GHG emissions or actual net GHG removals (t CO <sub>2</sub> e) | Leakage GHG emissions (t CO <sub>2</sub> e) | GHG emission reductions or net anthropogenic GHG removals (t CO <sub>2</sub> e) |                 |              |
|--|---------------------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------|-----------------|--------------|
|  |                                                                           |                                                                        |                                             | Before 01/01/2013                                                               | From 01/01/2013 | Total amount |
|  | 41,352                                                                    | 0                                                                      | 0                                           | 0                                                                               | 41,352          | 41,352       |

### E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

| Amount achieved during this monitoring period (t CO <sub>2</sub> e)              | Amount estimated ex ante for this monitoring period in the PDD (t CO <sub>2</sub> e) |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 9,012 (in 2017)                                                                  | 41,445 (in 2017)                                                                     |
| 12,608 (in 2018)                                                                 | 49,436 (in 2018)                                                                     |
| 19,732 (in 2019)                                                                 | 20,452 (in 2019)                                                                     |
| 41,352 (for 27 months (822 days) of this monitoring period) (tCO <sub>2</sub> e) | 111,333 (for 27 months (822 days) of this monitoring period) (tCO <sub>2</sub> e)    |

Percent difference is calculated as;

$$[(41,352 - 111,333) / (111,333) \times 100] = - 62.86\%$$

#### **E.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the PDD”**

Average yearly emission reductions have been calculated by proportioning expected annual generation to the days included by this monitoring period. Average yearly emission reduction has been multiplied by monitoring period (in days) to calculate estimated emission reduction.

(Expected annual generation x emission factor) x (days included / 365)

#### **E.6. Remarks on increase in achieved emission reductions**

Ex-ante emission reduction was calculated as 111,333 tCO<sub>2</sub> for 27 months (822 days) while actual reductions was found as 41,352 tCO<sub>2</sub> for the same amount of days. Therefore, - 62.86% difference was occurred between ex-ante and actual emission reductions.

Both actual electricity generation and actual emission reduction values are lower than the estimated values. The value in the registered PDD is calculated ex-ante for duration of one complete year and assuming a certain incoming flow rate. Since the project is a HEPP, seasonal effects are significant on the monthly generation rates and deviations from the calculated values are acceptable. On the other hand, the electricity generation is dependent on water flow estimation; which is a natural phenomenon and cannot be estimated with 100% accuracy, and minor deviations from the calculated values are acceptable.

#### **E.7. Remarks on scale of small-scale project activity**

NA

|                    |              |
|--------------------|--------------|
| <b>Indicator</b>   | Air Quality  |
| Mitigation measure | Not required |

|                                     |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chosen Parameters                   |        | 1-SO <sub>2</sub> emissions reductions<br>2-NO <sub>x</sub> emissions reductions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Current Situation of the Parameters |        | <p>1- Total SO<sub>2</sub> emission related to electricity generation is about 621.31 Gg in 2011 according to National Inventory of Turkey<sup>13</sup>. Considering that electricity generation in 2011 is 229,395.1 GWh<sup>14</sup>, SO<sub>2</sub> emission per MWh is calculated as 2.71 kg/MWh.</p> <p>In parallel to the electricity generation, actual SO<sub>2</sub> emission reduction has been realized as about 202.9 tons during monitoring period compared to baseline scenario.</p> <p>2- Total NO<sub>x</sub> emission related to electricity generation is about 263.97 Gg in 2011 according to National Inventory of Turkey. NO<sub>x</sub> emission per MWh is calculated as 1.15 kg.</p> <p>In parallel to the electricity generation, actual NO<sub>x</sub> emission reduction has been realized as about 86.2 tons during monitoring period.</p> |
| Future Target for Parameters        |        | 1-SO <sub>2</sub> emission reduction corresponding to annual generation.<br>2- NO <sub>x</sub> emission reduction corresponding to annual generation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Way of Monitoring                   | How    | Electricity generated by the project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                     | When   | Yearly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                     | By Who | Project Owner                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

|                                     |      |                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator                           |      | Quality of Employment                                                                                                                                                                                                                                                                                                                                               |
| Mitigation measure                  |      | <p>All recruited technical staff is trained for operation and maintenance of equipment and Health and safety measures. Also, staff working with high voltage equipment is certified (also required by regulations). The trainings are renewed for new staff if necessary.</p> <p>All health and safety measurements are applied according to local regulations.</p> |
| Chosen Parameters                   |      | Number of certificates issued/trainings provided.                                                                                                                                                                                                                                                                                                                   |
| Current Situation of the Parameters |      | <p>Existing and new staff are being continuously trained in relevant disciplines. Certificates are provided to DOE.</p> <p>General HSE training: 19/10/2018 – 20/10/2018<br/>Emergency training valid for 14/03/2018 – 14/03/2021<br/>General HSE training: 18/07/2019 – 19/07/2019<br/>Emergency training: 08/05/2019</p>                                          |
| Future Target for Parameters        |      | All relevant staff employed by project owner to be trained for Health and safety issues and relevant staff should be certified for working at high voltage environment.                                                                                                                                                                                             |
| Way of Monitoring                   | How  | Through review employment records and training documents/certificates                                                                                                                                                                                                                                                                                               |
|                                     | When | Yearly                                                                                                                                                                                                                                                                                                                                                              |

<sup>13</sup>[http://unfccc.int/files/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/application/zip/tur-2013-crf-12apr.zip](http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/tur-2013-crf-12apr.zip)

<sup>14</sup> [http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim\(22-45\)/23.xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/23.xls)

|  |           |               |
|--|-----------|---------------|
|  | By<br>Who | Project Owner |
|--|-----------|---------------|

|                                     |           |                                                                                                                                                                    |
|-------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Indicator</b>                    |           | Balance of payments                                                                                                                                                |
| Mitigation measure                  |           | Not required                                                                                                                                                       |
| Chosen Parameters                   |           | Currency saving due to avoided fuel import.                                                                                                                        |
| Current Situation of the Parameters |           | During monitoring period, about 16.440 million m <sup>3</sup> NG has been saved which corresponds to € 3,235,016. <sup>15, 16, 17</sup>                            |
| Future Target for Parameters        |           | Natural gas consumption avoidance parallel to actual annual electricity generation.                                                                                |
| Way of Monitoring                   | How       | Through comparing electricity generated by Çamlıca II and natural gas that would be used to produce the same amount of electricity according to baseline scenario. |
|                                     | When      | Yearly                                                                                                                                                             |
|                                     | By<br>Who | Project Owner                                                                                                                                                      |

|                    |  |                                                                                                                                                                                                                                                                                                   |
|--------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Indicator</b>   |  | Water Quality and Quantity                                                                                                                                                                                                                                                                        |
| Mitigation measure |  | Project has a channel which provides the required water from the tail water of Çamlıca I HEPP needs 30m <sup>3</sup> /sec flow. <sup>19</sup><br><br>Domestic waste generated at the construction site is handled according to the national regulations on handling domestic waste. <sup>20</sup> |
| Chosen Parameters  |  | Amount of water released.                                                                                                                                                                                                                                                                         |

<sup>15</sup> [http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim\(22-45\)/23.xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/23.xls)

<sup>16</sup> [Tukey National Greenhouse Gas Inventory Report 1990-2011, p17](#)

<sup>17</sup> [http://www.igdas.com.tr/Dynamic/Individual\\_Natural\\_Gas\\_Price\\_List.aspx?MI=2&CMI=2](http://www.igdas.com.tr/Dynamic/Individual_Natural_Gas_Price_List.aspx?MI=2&CMI=2) based on 01/01/2011 Natural Gas price

|                                     |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Current Situation of the Parameters |        | <p>Hydrogeological and hydrobiological assessment report is prepared by independent experts. Flow released is monitored and recorded by DSI. Data for flow released is submitted to DOE and GS, together with assessment report and flow measurement records. Released flow is in compliance with biological requirements and mandates of relevant institutions.</p> <p>On the other hand, Life line water amounts of whole crediting period has been provided. However, due to the high seasonal changes, the electricity generation and amount of water used were not consistent to the values expected before. As can be seen in ex-ante and actual situation calculations, there is almost 63% difference between them. Therefore, the water release as life line water was changed, too.</p> <p>According to the minimum flow letter revised by DSI, minimum flows are determined as;</p> <ul style="list-style-type: none"> <li>- 2,23 m<sup>3</sup>/sec for October, November, December, January, February, July, August and September</li> <li>- 3,55 m<sup>3</sup>/sec for March</li> <li>- 6,26 m<sup>3</sup>/sec for April</li> <li>- 5,71m<sup>3</sup>/sec for May</li> <li>- 3,32 m<sup>3</sup>/sec for June<sup>18</sup></li> </ul> <p>According to the threshold values, the months including some days that the minimum flow remained under limits are represented below:<sup>19</sup></p> <p>2017: April, May, June, July, August, September, December</p> <p>2018: April, May, June</p> <p>2019: January, February</p> |
| Future Target for Parameters        |        | Minimum amount of water to maintain for aquatic life <sup>22</sup> in riverbeds will be met.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Way of Monitoring                   | How    | Flow measurement at the downstream of the weir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                     | When   | Flow is monitored continuously and recorded by the gauging device                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                     | By Who | Facility Manager and impartial expert                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

|                                     |        |                                                                                                                   |
|-------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------|
| <b>Indicator</b>                    |        | Quantitative employment and income generation                                                                     |
| Mitigation measure                  |        | Mitigation measure is not required for this indicator.                                                            |
| Chosen Parameters                   |        | Payment made to the staff                                                                                         |
| Current Situation of the Parameters |        | Number of employees recruited on site is 12. The list of staff and social insurance records are submitted to DOE. |
| Future Target for Parameters        |        | Project will create new job opportunities compared to baseline scenario.                                          |
| Way of Monitoring                   | How    | Pay checks and other employment documents.                                                                        |
|                                     | When   | Annually                                                                                                          |
|                                     | By Who | Project Owner                                                                                                     |

<sup>18</sup> Minimum Flow Letter

<sup>19</sup> Life water line records of DSI

|                                     |        |                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Indicator</b>                    |        | Other pollutants                                                                                                                                                                                                                                                                                                                                                                                         |
| Mitigation measure                  |        | Waste oil has been collected and stored under confined conditions and as per regulations. Waste management plan has been prepared for the project site.                                                                                                                                                                                                                                                  |
| Chosen Parameters                   |        | Solid waste and waste oil treatment                                                                                                                                                                                                                                                                                                                                                                      |
| Current Situation of the Parameters |        | The plant does not use high amounts of oil, once the containers are full, waste oil is removed by an authorized company or municipality services. Residential wastes and solid wastes due to daily operation of the personnel have been stored in containers under confined conditions. Wastes are either be collected by the local municipality or dumped to sites designated by the local authorities. |
| Future Target for Parameters        |        | Waste oil will be used and stored appropriately. Service receipts will be kept and used to track operations.                                                                                                                                                                                                                                                                                             |
| Way of Monitoring                   | How    | By checking service receipts or operation logs.                                                                                                                                                                                                                                                                                                                                                          |
|                                     | When   | Yearly                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                     | By Who | Project Owner                                                                                                                                                                                                                                                                                                                                                                                            |

<sup>19</sup> PIF page 11

<sup>20</sup> PIF page 97

<sup>21</sup> PIF page 120

<sup>22</sup> Ecosystem Assessment Report page 27

