



# 78 MW AKOCAK HYDROELECTRIC POWER PLANT

DOCUMENT PREPARED BY GTE

|                          |                                                                                                                                                                 |
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| <b>Project Title</b>     | 78 MW AKOCAK HYDROELECTRIC POWER PLANT                                                                                                                          |
| <b>Version</b>           | 05                                                                                                                                                              |
| <b>Report ID</b>         | -                                                                                                                                                               |
| <b>Date of Issue</b>     | 14/09/2021                                                                                                                                                      |
| <b>Project ID</b>        | 535                                                                                                                                                             |
| <b>Monitoring Period</b> | 01/01/2016 – 30/06/2020                                                                                                                                         |
| <b>Prepared By</b>       | GTE                                                                                                                                                             |
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# 1 PROJECT DETAILS

## 1.1 Summary Description of the Implementation Status of the Project

AKOCAK is a run of river type hydroelectric power plant (HEPP) project located on Karadere River, in Trabzon province, in East Black Sea Region of Turkey. The purpose of the project is to generate energy from the running waters of Karadere River. The electricity generation license has been awarded to Çanakçı HES Elektrik Üretim A.Ş. for a period of 38 years 10 months 22 days years from the date 01/01/2016 by the Turkish licensing authority named as Energy Market Regulatory Authority (EMRA).

The project includes two weirs. The first weir called Erikli weir is built on Alcak Brook, a branch of Karadere, on 1,339 meters riverbed elevation. A sediment pool of 41 meters long and 2.3 meters wide is built along the riverbed. The other weir called Akocak weir is built on Karadere branch of the river, on 1,328 meter riverbed elevation. The sediment pool of Akocak weir is 41 meters long and 4.3 meters wide. The powerhouse is located on Karadere River, at 570 meters riverbed elevation.

The water collected at the Erikli weir is connected with a 3 meter diameter, circular section, derivation tunnel of 3,250 meters long to the upstream of Akocak weir. The Akocak weir shall transmit the collected waters to a surge tank through a 6,150 meters long transmission tunnel of 3 meters cross section. The penstock extending from the surge tank to the powerhouse is 1,842 meters long, with an average diameter of 1.82 meters.

The power house includes two turbines of vertical pelton type, each 42.09 MWm/41.25 MWe. The design flow rate is 12.30 m<sup>3</sup>/sec. Net head is 744 meters. There are two generators, each 48.75 MVA. The installed capacity of Akocak HEPP is 84.18 MWm/82.5 MWe. The generated electrical energy is connected to Arsin TM grid substation through a double circuit 2 x 477 MCM, 32 km long 154 kV transmission line. The annual estimated electrical energy generation is 257.440 GWh. Corresponding emission reduction is about 144,681 tCO<sub>2</sub> per year. The project has generated 865.034 GWh electricity in the whole monitoring period corresponding to 557,944 tCO<sub>2</sub>.

**Table 1. Milestones of the Project**

| Milestone        | Date       |
|------------------|------------|
| License Issuance | 23/11/2005 |

|                                                      |                         |
|------------------------------------------------------|-------------------------|
| EIA Approval                                         | 17/10/2006              |
| Equipment Purchase Agreement                         | 05/10/2006*             |
| Start of Construction                                | 01/12/2006              |
| License Amendment                                    | 17/05/2007              |
| Carbon Agreement                                     | 10/06/2008              |
| LSC Meeting                                          | 27/10/2008              |
| Provisional Acceptance & Commissioning<br>for Unit 1 | 29/07/2010              |
| Provisional Acceptance & Commissioning<br>for Unit 2 | 30/06/2010              |
| First crediting period                               | 01/07/2010 – 30/06/2020 |
| License Amendment                                    | 24/12/2015              |
| Change of project owner                              | 01/01/2016              |

(\*Investment Decision Date)

The main goals of the Akocak HEPP project include;

- Using Turkey's hydroelectric potential to meet the increasing demand for electricity and contributing toward the guarantee of Turkey's energy security.
- Increase the share of run of river type HEPPs in the mix of electricity generation in Turkey, reduce dependency on imported fossil fuel and as a consequence provide a tangible reduction in GHG emissions.
- Contribute to economic development by creating direct and indirect job opportunities during the construction and operation phases.

## 1.2 Sectoral Scope and Project Type

Proposed project activity involves electricity generation from renewable sources therefore it is categorized in the sectoral scope 1 "Energy Industry – Renewable -/Non-renewable Sources" according to the UNFCCC definition.

Project consists of two weirs and a powerhouse. Project is not a part of grouped project.

### 1.3 Project Proponent

|                          |                                                                                          |
|--------------------------|------------------------------------------------------------------------------------------|
| <b>Organization name</b> | ÇANAKÇI HES ELEKTRİK ÜRETİM A.Ş.                                                         |
| <b>Contact person</b>    | Muhammed Hilal YILDIRIM                                                                  |
| <b>Title</b>             | -                                                                                        |
| <b>Address</b>           | Ofis Lamartine Kocatepe Mah. Cumhuriyet Cad. No:5<br>Kat:6 Ofis no: TT16 Taksim İstanbul |
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|                          |                                                                                           |
|--------------------------|-------------------------------------------------------------------------------------------|
| <b>Organization name</b> | GTE KARBON SÜRDÜRÜLEBİLİR ENERJİ EĞT. DAN. VE TİC. A.Ş.                                   |
| <b>Contact person</b>    | M. Kemal DEMİRKOL                                                                         |
| <b>Title</b>             | Director                                                                                  |
| <b>Address</b>           | MAIDAN - Mustafa Kemal Mah. 2118. Cad. No: 4 C Blok<br>42 06510 Cankaya - Ankara – TURKEY |
| <b>Telephone</b>         | +90 312 514 63 63                                                                         |
| <b>Email</b>             | <a href="mailto:kemal@gte.com.tr">kemal@gte.com.tr</a>                                    |

### 1.4 Other Entities Involved in the Project

None

### 1.5 Project Start Date

The project has started operation on 01/07/2010.

### 1.6 Project Crediting Period

Crediting period of the project is 10 years between 01/07/2010 and 30/06/2020. Moreover, crediting period will be renewed twice.

## 1.7 Project Location

The Akocak HEPP project is located within the boundaries of Arakli District of Trabzon Province. The nearest settlements to the project site are Kayaici and Gelber Villages. The GPS coordinates of the project is given following table:

**Table 2. Project Coordinates**

|             | LONGITUDE       | LATITUDE        |
|-------------|-----------------|-----------------|
| Erikli Weir | E 39° 57' 5.4"  | N 40° 36' 23.8" |
| Akocak Weir | E 39° 54' 54.9" | N 40° 36' 47.5" |
| Powerhouse  | E 39° 54' 12.9" | N 40° 40' 13"   |

Also the project location represented on the map of Turkey is shown below.



**Figure 1. Project Location**

## 1.8 Title and Reference of Methodology

The United Nations approved consolidated baseline methodology applicable to this project is ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources”, Version 10<sup>1</sup>

ACM0002 refers to the following tools:

- “Tool for the demonstration and assessment of additionality”, Version 05.2, <sup>2</sup>and

<sup>1</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/approved>

<sup>2</sup> [https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf/history\\_view](https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf/history_view)



- “Tool to calculate the emission factor for an electricity system”, Version 02<sup>3</sup>.

## 1.9 Participation under other GHG Programs

None

## 1.10 Other Forms of Credit

Not available. Project does not produce other kinds of environmental credits. Project's GHG emissions are not a part of an emissions trading program or any other mechanism that includes GHG allowance trading.

## 1.11 Sustainable Development

The project helps Turkey to stimulate the commercial application of grid connected renewable energy technologies and markets. It is also a crucial sample of establishing the feasibility of larger grid connected small to medium scale runoff-river HEPPs as a tool to support energy security, improved air quality, alternative sustainable energy, improved local source of income and sustainable renewable energy industry development. In this sense, the project contributes to SDG 7 by providing clean energy to the grid. The project also highly supports the sustainable economic development in the region. It created employment during the construction and the operation phase of the plant in accordance with SDG 8. It has significant contribution in diminishing carbon emissions and protecting the climate compared to the business-as-usual scenario which is considered as a contribution to SDG 13. Therefore, the project has positive influences on sustainable development and contributes to UN sustainable development goals SDG 7, 8 and 13.

# 2 SAFEGUARDS

## 2.1 No Net Harm

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<sup>3</sup> [https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf/history\\_view](https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf/history_view)

There would be two main environmental harms resulted from the project implementation which are related to the lifeline water and fish communities. In this project, there are two regulators as Erikli and Akocak. Both regulators have fish passages allowing fish mobility and also the discharge of lifeline water to the river. The lifeline water is monitored 7/24 by Streamaauge Stations of DSI. Moreover, there are spot checkings of lifeline water by DSI and General Directorate of Nature Conservation and National Parks.

## 2.2 Local Stakeholder Consultation

Initial Stakeholder meeting of the project was organized and held on October 27th, 2008 in Arakli District of Trabzon Province. Local and international NGOs, Government Agencies and individuals were invited. Invitations were made by registered mails, newspaper ads and through village heads. Although there exist no DNA in Turkey, Ministry of Environment and Forestry and Ministry of Energy and Natural Resources were invited by registered mail to the meeting. Three main issues raised by the participants during the SC meeting were:

- Are there lands still not expropriated? When will the costs of the land be paid?
- The number of fishes in the brook seems to have decreased.
- Will the project provide employment opportunities?

All comments from stakeholders are taken into account and promptly responded.

The main way of communication between locals and project owner is face-to-face communication. The social relations between them are strong and open. If there is any problem, they can easily reach responsables and tell their grievances.

There is no grievance/compliant about the project implementation in this monitoring period.

## 2.3 AFOLU-Specific Safeguards

N/A

# 3 IMPLEMENTATION STATUS

## 3.1 Implementation Status of the Project Activity

There was no problem faced during project implementation in this monitoring period. It has generated 865,034 MWh clean electricity in the whole monitoring period corresponding

557,944 tCO<sub>2</sub> emission reduction. This value is calculated as 192,230 MWh and 123,988 tCO<sub>2</sub> per annum, respectively.

## 3.2 Deviations

### 3.2.1 Methodology Deviations

None

### 3.2.2 Project Description Deviations

Project installed capacity has been increased from 82.46 MWm / 81 MWe to 84.18 MWm / 82.5 MWe on 06/11/2017. However, the annual generation which is 257.440 GWh has remained the same. So, there is no need to change the additionality of the project.

The owner of the project has also been changed from Akenerji Elektrik Üretim A.Ş to Çanakçı HES Elektrik Üretim A.Ş on 01/01/2016. The company was sold.

## 3.3 Grouped Projects

Project is not a part of grouped project.

# 4 DATA AND PARAMETERS

## 4.1 Data and Parameters Available at Validation

| Data / Parameter                                              | EG <sub>y, Total</sub>                                                                       |
|---------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Data unit                                                     | GWh                                                                                          |
| Description                                                   | Net Electricity delivered to the grid by power plants in Turkey in years 2005, 2006 and 2007 |
| Source of data                                                | TEIAS web page                                                                               |
| Value applied                                                 | 155,469.1 GWh; 169,543.1 GWh; 183,339.7 GWh                                                  |
| Justification of choice of data or description of measurement | Data from Grid Operator has been used.                                                       |

|                                       |                                                                                                                                             |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>methods and procedures applied</b> |                                                                                                                                             |
| <b>Purpose of Data</b>                | Data used for emission reduction calculation (for calculation of OM, Net-to-Gross electricity ratio and share of low-cost must-run sources) |
| <b>Comments</b>                       | -                                                                                                                                           |

| <b>Data / Parameter</b>                                                                             | <b>EF<sub>CO2, i, y i</sub></b>                                                                                                                                                                                                                                                                                                                                                  |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------|------|------|---------|------|----------|------|--------|------|-----|------|--------|------|-------------|------|
| <b>Data 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 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>Justification of choice of data or description of measurement methods and procedures applied</b> | According to ACM0002, 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</b>                                                                              | BM calculations                                                                                                                                                                                                                                                                                                                                                                  |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |
| <b>Comments</b>                                                                                     | -                                                                                                                                                                                                                                                                                                                                                                                |                    |                               |      |      |         |      |          |      |        |      |     |      |        |      |             |      |

| Data / Parameter                                                                             | FC <sub>i, y</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |                                     |                             |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|-------------------------------------|-----------------------------|--|--|------|------|------|-------------------------------------|-----------------------------|-----------|-----------|-----------|-----------|------------|------------|---------|------------|------------|------------|-------------|------------|----------|-----------|-----------|-----------|-----------|------------|------------|--------|--------|--------|---------|---------|-----|--------|----|---|--------|--------|---------|--------|--------|--------|---------|---------|-------------|------------|------------|------------|------------|-------------|
| Data unit                                                                                    | Tons or 1000m <sup>3</sup> for gases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |            |                                     |                             |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Description                                                                                  | Amount of fuels consumed by thermal power plants for electricity generation in terms of fossil fuel type “i” in year “y”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |            |                                     |                             |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Source of data                                                                               | TEIAS web page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |            |                                     |                             |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Value applied                                                                                | <table><tr><th></th><th>2005</th><th>2006</th><th>2007</th><th>Total Fuel Consumption<br/>2005-2007</th><th>Total Emission<br/>2005-2007</th></tr><tr><td>Hard Coal</td><td>5,259,058</td><td>5,617,863</td><td>6,029,143</td><td>16,906,064</td><td>34,915,268</td></tr><tr><td>Lignite</td><td>48,319,143</td><td>50,583,810</td><td>61,223,821</td><td>160,126,774</td><td>96,197,334</td></tr><tr><td>Fuel Oil</td><td>2,005,899</td><td>1,746,370</td><td>2,250,686</td><td>6,002,955</td><td>18,165,198</td></tr><tr><td>Diesel Oil</td><td>28,442</td><td>61,501</td><td>50,233</td><td>140,176</td><td>436,185</td></tr><tr><td>LPG</td><td>12,908</td><td>33</td><td>0</td><td>12,941</td><td>36,623</td></tr><tr><td>Naphtha</td><td>84,481</td><td>13,453</td><td>11,441</td><td>109,375</td><td>334,828</td></tr><tr><td>Natural Gas</td><td>15,756,764</td><td>17,034,548</td><td>20,457,793</td><td>53,249,105</td><td>106,643,758</td></tr></table> |            |            |                                     |                             |  |  | 2005 | 2006 | 2007 | Total Fuel Consumption<br>2005-2007 | Total Emission<br>2005-2007 | Hard Coal | 5,259,058 | 5,617,863 | 6,029,143 | 16,906,064 | 34,915,268 | Lignite | 48,319,143 | 50,583,810 | 61,223,821 | 160,126,774 | 96,197,334 | Fuel Oil | 2,005,899 | 1,746,370 | 2,250,686 | 6,002,955 | 18,165,198 | Diesel Oil | 28,442 | 61,501 | 50,233 | 140,176 | 436,185 | LPG | 12,908 | 33 | 0 | 12,941 | 36,623 | Naphtha | 84,481 | 13,453 | 11,441 | 109,375 | 334,828 | Natural Gas | 15,756,764 | 17,034,548 | 20,457,793 | 53,249,105 | 106,643,758 |
|                                                                                              | 2005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2006       | 2007       | Total Fuel Consumption<br>2005-2007 | Total Emission<br>2005-2007 |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Hard Coal                                                                                    | 5,259,058                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5,617,863  | 6,029,143  | 16,906,064                          | 34,915,268                  |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Lignite                                                                                      | 48,319,143                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 50,583,810 | 61,223,821 | 160,126,774                         | 96,197,334                  |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Fuel Oil                                                                                     | 2,005,899                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1,746,370  | 2,250,686  | 6,002,955                           | 18,165,198                  |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Diesel Oil                                                                                   | 28,442                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 61,501     | 50,233     | 140,176                             | 436,185                     |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| LPG                                                                                          | 12,908                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 33         | 0          | 12,941                              | 36,623                      |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Naphtha                                                                                      | 84,481                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 13,453     | 11,441     | 109,375                             | 334,828                     |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Natural Gas                                                                                  | 15,756,764                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 17,034,548 | 20,457,793 | 53,249,105                          | 106,643,758                 |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Justification of choice of data or description of measurement methods and procedures applied | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |            |                                     |                             |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Purpose of Data                                                                              | Data used for OM calculation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |            |                                     |                             |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |
| Comments                                                                                     | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |            |                                     |                             |  |  |      |      |      |                                     |                             |           |           |           |           |            |            |         |            |            |            |             |            |          |           |           |           |           |            |            |        |        |        |         |         |     |        |    |   |        |        |         |        |        |        |         |         |             |            |            |            |            |             |

| Data / Parameter | GE                                                                       |
|------------------|--------------------------------------------------------------------------|
| Data unit        | %                                                                        |
| Description      | Generation efficiency of thermal power plants                            |
| Source of data   | Annex I- Tool to calculate the emission factor for an electricity system |

| Value applied | NCV                               | EF <sub>CO2</sub>      | Generation Efficiency | EF                      |
|---------------|-----------------------------------|------------------------|-----------------------|-------------------------|
|               | (Tj/kt or m <sup>3</sup> for gas) | (tCO <sub>2</sub> /Tj) | %                     | (tCO <sub>2</sub> /MWh) |
|               |                                   |                        |                       |                         |
| Coal          | 21.83                             | 89.5                   | 39.0%                 | 0.826                   |
| Lignite       | 6.61                              | 90.9                   | 39.0%                 | 0.839                   |
| Fuel Oil      | 40.08                             | 75.5                   | 39.5%                 | 0.688                   |
| Diesel        | 42.86                             | 72.6                   | 39.5%                 | 0.662                   |
| LPG           | 45.94                             | 61.6                   | 39.5%                 | 0.561                   |
| Naphtha       | 44.17                             | 69.3                   | 39.5%                 | 0.632                   |
| Natural Gas   | 36.88                             | 54.3                   | 60.0%                 | 0.326                   |

|                                                                                              |                              |
|----------------------------------------------------------------------------------------------|------------------------------|
| Justification of choice of data or description of measurement methods and procedures applied | -                            |
| Purpose of Data                                                                              | Data used for BM calculation |
| Comments                                                                                     | -                            |

| Data / Parameter                                                          | NCV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                        |                       |                         |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------|-------------------------|-----------------------|----|--|-----------------------------------|------------------------|---|-------------------------|------|-------|------|-------|-------|---------|------|------|-------|-------|----------|-------|------|-------|-------|--------|-------|------|-------|-------|-----|-------|------|-------|-------|---------|-------|------|-------|-------|-------------|-------|------|-------|-------|
| Data unit                                                                 | Tj/kt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                        |                       |                         |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Description                                                               | Net Calorific Values of Fuel combusted in power plants.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |                       |                         |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Source of data                                                            | TEIAS web page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                        |                       |                         |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Value applied                                                             | <table><tr><th></th><th>NCV</th><th>EF CO<sub>2</sub></th><th>Generation Efficiency</th><th>EF</th></tr><tr><th></th><th>(Tj/kt or m<sup>3</sup> for gas)</th><th>(tCO<sub>2</sub>/Tj)</th><th>%</th><th>(tCO<sub>2</sub>/MWh)</th></tr><tr><td>Coal</td><td>21.83</td><td>89.5</td><td>39.0%</td><td>0.826</td></tr><tr><td>Lignite</td><td>6.61</td><td>90.9</td><td>39.0%</td><td>0.839</td></tr><tr><td>Fuel Oil</td><td>40.08</td><td>75.5</td><td>39.5%</td><td>0.688</td></tr><tr><td>Diesel</td><td>42.86</td><td>72.6</td><td>39.5%</td><td>0.662</td></tr><tr><td>LPG</td><td>45.94</td><td>61.6</td><td>39.5%</td><td>0.561</td></tr><tr><td>Naphtha</td><td>44.17</td><td>69.3</td><td>39.5%</td><td>0.632</td></tr><tr><td>Natural Gas</td><td>36.88</td><td>54.3</td><td>60.0%</td><td>0.326</td></tr></table> |                        | NCV                   | EF CO <sub>2</sub>      | Generation Efficiency | EF |  | (Tj/kt or m <sup>3</sup> for gas) | (tCO <sub>2</sub> /Tj) | % | (tCO <sub>2</sub> /MWh) | Coal | 21.83 | 89.5 | 39.0% | 0.826 | Lignite | 6.61 | 90.9 | 39.0% | 0.839 | Fuel Oil | 40.08 | 75.5 | 39.5% | 0.688 | Diesel | 42.86 | 72.6 | 39.5% | 0.662 | LPG | 45.94 | 61.6 | 39.5% | 0.561 | Naphtha | 44.17 | 69.3 | 39.5% | 0.632 | Natural Gas | 36.88 | 54.3 | 60.0% | 0.326 |
|                                                                           | NCV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EF CO <sub>2</sub>     | Generation Efficiency | EF                      |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
|                                                                           | (Tj/kt or m <sup>3</sup> for gas)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (tCO <sub>2</sub> /Tj) | %                     | (tCO <sub>2</sub> /MWh) |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Coal                                                                      | 21.83                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 89.5                   | 39.0%                 | 0.826                   |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Lignite                                                                   | 6.61                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 90.9                   | 39.0%                 | 0.839                   |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Fuel Oil                                                                  | 40.08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 75.5                   | 39.5%                 | 0.688                   |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Diesel                                                                    | 42.86                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 72.6                   | 39.5%                 | 0.662                   |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| LPG                                                                       | 45.94                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 61.6                   | 39.5%                 | 0.561                   |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Naphtha                                                                   | 44.17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 69.3                   | 39.5%                 | 0.632                   |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Natural Gas                                                               | 36.88                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 54.3                   | 60.0%                 | 0.326                   |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |
| Justification of choice of data or description of measurement methods and | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |                       |                         |                       |    |  |                                   |                        |   |                         |      |       |      |       |       |         |      |      |       |       |          |       |      |       |       |        |       |      |       |       |     |       |      |       |       |         |       |      |       |       |             |       |      |       |       |

|                           |                                     |
|---------------------------|-------------------------------------|
| <b>procedures applied</b> |                                     |
| <b>Purpose of Data</b>    | Data used for OM and BM calculation |
| <b>Comments</b>           | -                                   |

## 4.2 Data and Parameters Monitored

|                                                                        |                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter</b>                                                | <b>EG<sub>facility, y</sub></b>                                                                                                                                                                                                                                                                          |
| <b>Data unit</b>                                                       | MWh                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>                                                     | Net Electricity generated and delivered to the grid by 78MW Akocak HEPP in year “y”                                                                                                                                                                                                                      |
| <b>Source of data</b>                                                  | Site records and EPIAS values                                                                                                                                                                                                                                                                            |
| <b>Description of measurement methods and procedures to be applied</b> | The internal consumption of the facility was subtracted from the gross generation. The internal consumption was also taken from the facility's records and cross-checked with the EPIAS data.                                                                                                            |
| <b>Frequency of monitoring/recording</b>                               | Continuous measurement at the site and daily and monthly recording were applied. The plant manager and the staff extracted the records regularly every day. The monthly records gathered by TEİAŞ remotely.                                                                                              |
| <b>Value monitored</b>                                                 | 865,034 MWh during monitoring period. EG per annum is calculated as 192,230 MWh for this monitoring period.                                                                                                                                                                                              |
| <b>Monitoring equipment</b>                                            | Four calibrated ammeters (two of them are spare). Meters used are in compliance with the regulation <sup>4</sup> on meters issued by relevant government agencies and have 0.5S accuracy class.                                                                                                          |
| <b>QA/QC procedures to be applied</b>                                  | Maintenance and calibration of the metering devices will be made by TEİAŞ periodically. If there is a significant difference between the readings of two devices, maintenance and tests of the metering devices and the associated equipment will be done before waiting for the periodical maintenance. |

<sup>4</sup> <https://www.epdk.gov.tr/Detay/Icerik/3-0-0-128/tebligler>

|                            |                 |
|----------------------------|-----------------|
| <b>Purpose of the data</b> | ER calculations |
| <b>Calculation method</b>  | N/A             |
| <b>Comments</b>            | -               |

|                                                                        |                                                                                                                                                            |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter</b>                                                | Cap <sub>PJ</sub>                                                                                                                                          |
| <b>Data 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>Description of measurement methods and procedures to be applied</b> | The parameter were determined from the labels on the equipment and letter for approval of commissioning issued by Ministry of energy and Natural Resources |
| <b>Frequency of monitoring/recording</b>                               | Yearly                                                                                                                                                     |
| <b>Value monitored</b>                                                 | 82,500,000 W <sup>5</sup>                                                                                                                                  |
| <b>Monitoring equipment</b>                                            | N/A                                                                                                                                                        |
| <b>QA/QC procedures to be applied</b>                                  | N/A                                                                                                                                                        |
| <b>Purpose of the data</b>                                             | To understand the necessity of calculation of project emission according to applied methodology                                                            |
| <b>Calculation method</b>                                              | N/A                                                                                                                                                        |
| <b>Comments</b>                                                        | -                                                                                                                                                          |

|                         |                                                                                                                                          |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data / Parameter</b> | AP <sub>J</sub>                                                                                                                          |
| <b>Data unit</b>        | m <sup>2</sup>                                                                                                                           |
| <b>Description</b>      | Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full |

<sup>5</sup> Project Generation License (revised, capacity increase to 82.5 MWe)



|                                                                        |                                                                                                                                |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Source of data</b>                                                  | Project site                                                                                                                   |
| <b>Description of measurement methods and procedures to be applied</b> | Measured from topographical surveys or maps                                                                                    |
| <b>Frequency of monitoring/recording</b>                               | Yearly                                                                                                                         |
| <b>Value monitored</b>                                                 | 38,543.722 (Akocak Weir) and 33,877.016 (Erikli Weir)m <sup>2</sup> <sup>6</sup>                                               |
| <b>Monitoring equipment</b>                                            | N/A                                                                                                                            |
| <b>QA/QC procedures to be applied</b>                                  | N/A                                                                                                                            |
| <b>Purpose of the data</b>                                             | To understand the necessity of calculation of project emission according to applied methodology                                |
| <b>Calculation method</b>                                              | N/A                                                                                                                            |
| <b>Comments</b>                                                        | Maximum area is given in Reservoir Map and considered in calculations. Annual measurements are not higher than baseline value. |

### 4.3 Monitoring Plan

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.

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

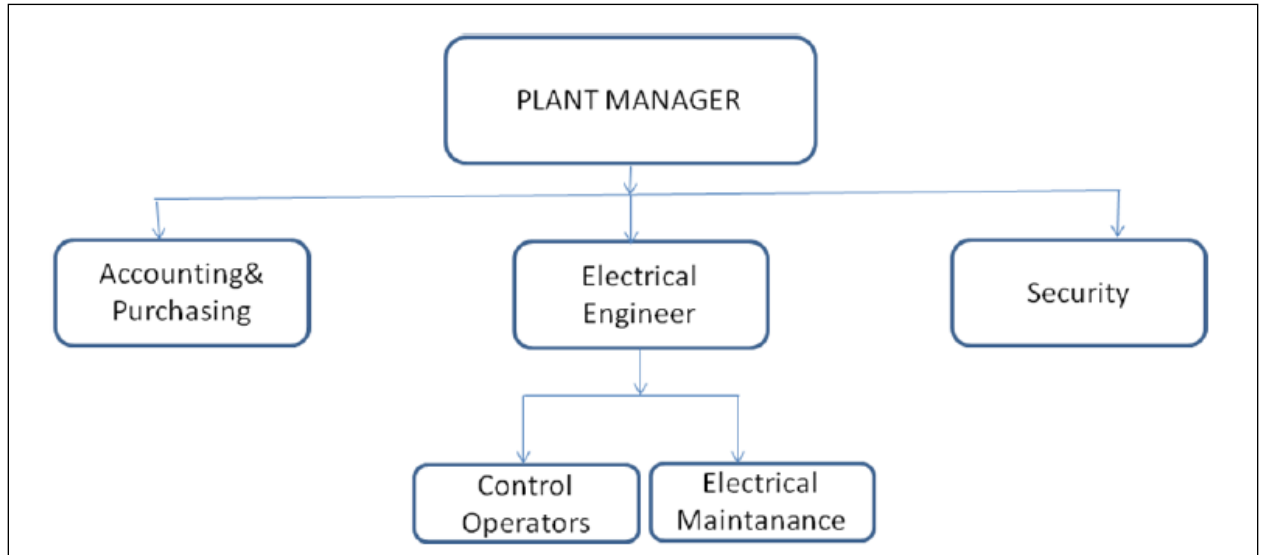
Net electricity generation is measured and recorded by both TEIAS and project owners for billing purposes therefore no new additional protocol is needed monitoring emission reduction. Power Plant Manager, is responsible for the electricity generated, gathering all relevant data and keeping the records. He is informed about VER concepts and mechanisms and how to monitor and collect the data which is used for emission reduction calculations.

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<sup>6</sup> Akocak HEPP Reservoir map

Generation data collected during crediting period is submitted to Global Tan Energy who is responsible for calculating the emission reduction subject to verification: Generation data is used to prepare monitoring reports which is used to determine the vintage from the project activity. These reports are submitted to the duly authorized and appointed Designated Operational Entity 'DOE' before each verification period.

The monitoring system organization chart is shown in Figure 3 below, in which the authority and responsibility of project management are defined.



**Figure 3. Operational structure of 78MW Akocak HEPP**

VER Team Members are;

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.

Control Operators & Electrical Maintenance: Staff is responsible for day to day operation and maintenance of the plant and equipments. All staffs were trained and had certificate for working with high voltage equipments.

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

Installation of meter and data monitoring are carried out according to the regulations by TEIAS. Readings are done using main metering devices and spare metering device is used for comparison only. Data from metering devices is recorded by TEIAS monthly and form

the basis for invoicing using the template formed by TEIAS<sup>7</sup>. In addition to the two metering devices, generation of the Akocak HEPP can be cross checked from EPIAS which is accessible using a password provided to electricity generation companies. Both the EPIAS data and the facility/TEIAS records are taken into account for comparison and to identify any anomalies.

Technical information of the meters is tabulated below:

| Brand   | Type      | Serial Number            |
|---------|-----------|--------------------------|
| Actaris | SL761A071 | 53064405 (main- unit 1)  |
| Actaris | SL761A071 | 53064406 (spare- unit 1) |
| Actaris | SL761A071 | 53064407 (main- unit 2)  |
| Actaris | SL761A071 | 53064408 (spare- unit 1) |

TEIAS is responsible for calibration and maintenance. The meters were calibrated by the TEIAS on 27/05/2010 as confirmed through first index protocol.

No change or calibration of the metering devices has been necessary during the monitoring period. However, they were changed on 13/08/2020 after the termination of the crediting period .

In case of a major failure at both metering at the same time, electricity generation by the plant since the last measurement is able to be monitored by another metering device at the inlet of the main substation operated by TEIAS where the electricity is fed to the grid. Electricity generated by the power plant is also available at the SCADA (supervisory control and data acquisition system) of the grid operator TEIAS, through the RTU (remote terminal unit) installed at the power plant and supervised by the Load Dispatch Centre of TEIAS.

The net electricity fed to the grid is measured continuously and recorded monthly by the TEIAS and plant staff. For consistency, recorded data are compared with electricity sale receipts.

All data collected are recorded daily and archived both as electronically and as hard copy for at least two years.

Calibration of the metering devices was made by TEIAS and sealed during first operation of the plant. The meters were calibrated by TEIAS when exists significant inconsistency between two devices using a fixed template or upon request by either project owner or TEIAS.

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<sup>7</sup> [http://www.teias.gov.tr/mali/GDUY/PRO\\_FORM/OLCUM/K01.xls](http://www.teias.gov.tr/mali/GDUY/PRO_FORM/OLCUM/K01.xls)

## 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 5.1 Baseline Emissions

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

$$ER_y = BE_y - PE_y - LE_y \quad (4)$$

Where:

$ER_y$  = Emission reductions in year  $y$  (tCO<sub>2</sub>)

$BE_y$  = Baseline emissions in year  $y$  (tCO<sub>2</sub>)

$PE_y$  = Project Emissions in year  $y$  (tCO<sub>2</sub>)

$LE_y$  = Leakage emissions in year  $y$  (tCO<sub>2</sub>)

Baseline emission is calculated according to the formula

$$BE_y = EG_y \times EF_y$$

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

$$BE_y (2016) = (171,771.62 \text{ MWh}) \times (0.645 \text{ Tco}_2/\text{MWh}) = 110,792 \text{ Tco}_2$$

$$BE_y (2017) = (164,805.27 \text{ MWh}) \times (0.645 \text{ Tco}_2/\text{MWh}) = 106,299 \text{ Tco}_2$$

$$BE_y (2018) = (213,860.98 \text{ MWh}) \times (0.645 \text{ Tco}_2/\text{MWh}) = 137,940 \text{ Tco}_2$$

$$BE_y (2019) = (164,630.39 \text{ MWh}) \times (0.645 \text{ Tco}_2/\text{MWh}) = 106,186 \text{ Tco}_2$$

$$BE_y (2020) = (149,965.27 \text{ MWh}) \times (0.645 \text{ Tco}_2/\text{MWh}) = 96,727 \text{ Tco}_2$$

$$\text{Total BE}_y = (865,034 \text{ MWh}) \times (0.645 \text{ Tco}_2/\text{MWh}) = 557,944 \text{ Tco}_2$$

## 5.2 Project Emissions

The proposed project activity involves two small reservoirs which are Akocak Weir and Erikli Weir. The power density is higher than 10 MW/m<sup>2</sup>, so, the project emissions of the project is ignored.

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

$$\text{PD} = \frac{\text{Cap}_{\text{PJ}} - \text{Cap}_{\text{BL}}}{\text{APJ} - \text{ABL}}$$

Where:

PD = Power density of the project activity (W/m<sup>2</sup>)

CapPJ = Installed capacity of the hydro power plant after the implementation of the project activity (W)

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

APJ = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m<sup>2</sup>)

ABL = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m<sup>2</sup>). For new reservoirs, this value is zero

For proposed project HEPP,

$$\text{CapPJ} = 82,500,000 \text{ W}$$

$$\text{CapBL} = 0.0 \text{ W}$$

$$\text{APJ} = 38,543.722 + 33,877.016 \text{ (m}^2\text{)}^8$$

$$\text{ABL} = 0.0 \text{ (m}^2\text{)}$$

Therefore PD is calculated as ;

$$\text{PD} = \frac{82,500,000 - 0}{\phantom{38,543.722 + 33,877.016 \text{ (m}^2\text{)}^8}}$$

<sup>8</sup> Akocak, Reservoir Map

72420.738 – 0

PD = 1,139.17 W/m<sup>2</sup>

As the calculation per the methodology also indicates, the project emissions from the reservoir is higher than 4W/m<sup>2</sup> and thus the emissions from water reservoir is ignored in the calculations.

### 5.3 Leakage

The energy generating equipment is not transferred from or to another activity. Therefore leakage is also considered as "0".<sup>9</sup>

LEy = 0

### 5.4 Net GHG Emission Reductions and Removals

| Year                                 | Baseline emissions or removals (tCO <sub>2</sub> e) | Project emissions or removals (tCO <sub>2</sub> e) | Leakage emissions (tCO <sub>2</sub> e) | Net GHG emission reductions or removals (tCO <sub>2</sub> e) |
|--------------------------------------|-----------------------------------------------------|----------------------------------------------------|----------------------------------------|--------------------------------------------------------------|
| Year 2016<br>(01/01/2016-31/12/2016) | 110,792                                             | 0,0000                                             | 0,0000                                 | 110,792                                                      |
| Year 2017<br>(01/01/2017-31/12/2017) | 106,299                                             | 0,0000                                             | 0,0000                                 | 106,299                                                      |
| Year 2018<br>(01/01/2018-31/12/2018) | 137,940                                             | 0,0000                                             | 0,0000                                 | 137,940                                                      |

<sup>9</sup> PDD page 30

|                                          |                |        |        |                |
|------------------------------------------|----------------|--------|--------|----------------|
| Year 2019<br>(01/01/2019-<br>31/12/2019) | 106,186        | 0,0000 | 0,0000 | 106,186        |
| Year 2020<br>(01/01/2020-<br>30/06/2020) | 96,727         | 0,0000 | 0,0000 | 96,727         |
| <b>Total</b>                             | <b>557,944</b> |        |        | <b>557,944</b> |

# APPENDIX X:

*Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.*