

# NİKSAR HYDROELECTRIC POWER PLANT MONITORING REPORT



Document Prepared By Ekobil Environmental Services and Consulting Ltd.

Contact Information : [info@ekobil.com](mailto:info@ekobil.com)

|                          |                                                                                                                                                                   |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project Title</b>     | Niksar Hydroelectric Power Plant                                                                                                                                  |
| <b>Version</b>           | 1.1                                                                                                                                                               |
| <b>Report ID</b>         | 1019                                                                                                                                                              |
| <b>Date of Issue</b>     | 29-08-2013 this version of the document issued                                                                                                                    |
| <b>Project ID</b>        | 1019                                                                                                                                                              |
| <b>Monitoring Period</b> | 24-May-2012 to 31-July-2013                                                                                                                                       |
| <b>Prepared By</b>       | Ekobil Environmental Services and Consultancy                                                                                                                     |
| <b>Contact</b>           | Ahlatlıbel Mahallesi, Güneykent Sitesi 1839 Sokak No:56 06805 ANKARA/Turkey<br>Tel:90.312 4891338<br>E-Mail: <a href="mailto:info@ekobil.com">info@ekobil.com</a> |

## TABLE OF CONTENTS

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| Table of Contents.....                                               | 2         |
| <b>1 Project Details .....</b>                                       | <b>3</b>  |
| 1.1 Summary Description of Project .....                             | 3         |
| 1.2 Sectoral Scope and Project Type .....                            | 5         |
| 1.3 Project Proponent.....                                           | 5         |
| 1.4 Other Entities Involved in the Project .....                     | 5         |
| 1.5 Project Start Date .....                                         | 6         |
| 1.6 Project Crediting Period.....                                    | 6         |
| 1.7 Project Location .....                                           | 6         |
| 1.8 Title and Reference of Methodology.....                          | 7         |
| <b>2 Implementation Status.....</b>                                  | <b>7</b>  |
| 2.1 Implementation Status of the Project Activity .....              | 7         |
| 2.2 Project Description Deviations.....                              | 7         |
| 2.3 Grouped Project .....                                            | 8         |
| <b>3 Data and Parameters.....</b>                                    | <b>9</b>  |
| 3.1 Data and Parameters Available at Validation .....                | 9         |
| 3.2 Data and Parameters Monitored .....                              | 12        |
| 3.3 Description of the Monitoring Plan.....                          | 14        |
| <b>4 Quantification of GHG Emission Reductions and Removals.....</b> | <b>18</b> |
| 4.1 Baseline Emissions .....                                         | 18        |
| 4.2 Project Emissions .....                                          | 19        |
| 4.3 Leakage.....                                                     | 20        |
| 4.4 Summary of GHG Emission Reductions and Removals .....            | 20        |
| <b>5 Additional Information .....</b>                                | <b>21</b> |

## 1 PROJECT DETAILS

### 1.1 Summary Description of Project

The Project activity is the Niksar Hydroelectric Power Plant (HPP) with an installed capacity 40.16 MW<sub>e</sub>. The electricity production license of Niksar Hydroelectric Power Plant (HPP) (the "Project Activity" or "PA") belongs to Niksar Enerji Üretim Ltd Şti. (the "Owner") a Turkish private company. The Project Activity aims to convert the potential energy of the Kelkit stream, at the Niksar town of Tokat province and produce electricity from a renewable source

The Project Activity went through a series of investigation, planning and engineering design studies and the project design changed due to geological and earthquake risk associated with the project area. As a result of the different alternatives on the water conveyance system, powerhouse location, the phases of the plants and design discharge, the Project Activity has been planned as a run-of-river type composed of the Akıncı weir, water intake structures, 12,014 m conveyance channel, a forebay, 2 penstocks, a powerhouse equipped with turbines having a total installed capacity of 40.16 MW<sub>e</sub> and other related facilities (See Figure 1 for the general layout of the project activity).

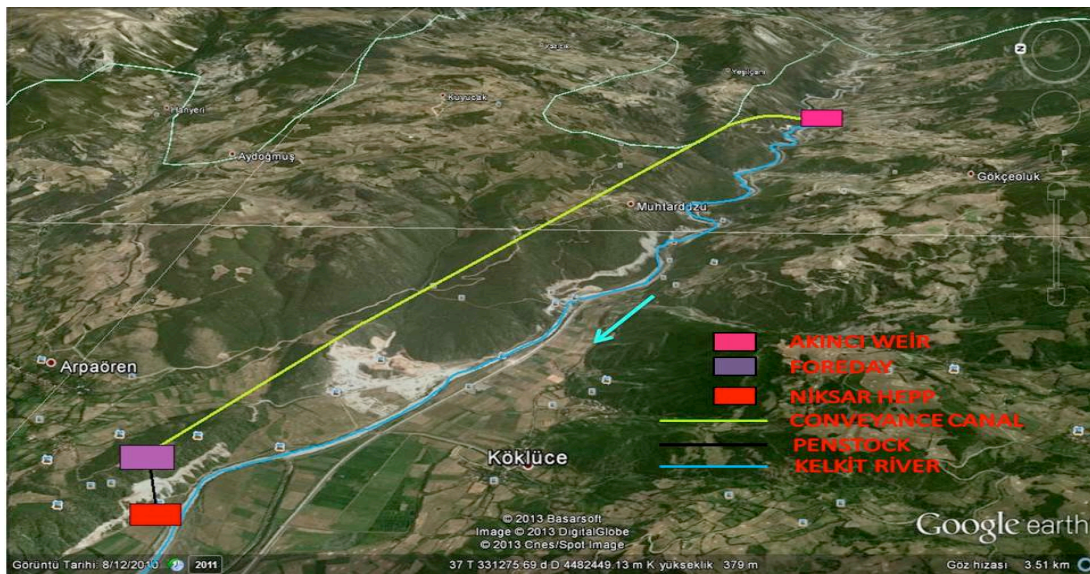


Figure 1: General Layout of Niksar HPP

The Project Activity utilizes the Kelkit stream water in a diversion-type run-of-river hydro power scheme to generate electricity with zero carbon emissions for the Turkish Power Grid. The project is estimated to produce, 215,203 MWh of electricity per year. This is the net amount of electricity that the project is exporting to the Turkish national grid.

The Major milestones at the project development history can be summarized as shown in the following table (Table 1):

**Table 1: Major project milestones**

| Date                           | Event                                                                                                                                                   | Reference                                                                         |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| October 26, 2005               | Project owner was invited to the auction for the license                                                                                                | EMRA Letter that confirms that company can attend the license auction process     |
| March 24, 2006                 | Main water Usage agreement signed                                                                                                                       | Water Usage Agreement                                                             |
| September 21, 2006             | Production License number EÜ/921-1/722 issued to Selen Elektrik previous title holder of the project                                                    | EMRA License number EÜ/921-1/722                                                  |
| November 15, 2006              | Quotation taken for a group of project including Niksar HPP                                                                                             | E-mail Correspondences including quotation                                        |
| July 5, 2007                   | First Amendment Made to the project's production license and capacity increased to 40.161 MWe                                                           | EMRA License number EÜ/1245-7/898                                                 |
| September 28, 2007             | LSC announced on Local Newspaper (Yeni Tokat)                                                                                                           | Yeni Tokat News Paper Clip                                                        |
| October 1, 2007                | Project Introduction File (PIF or PTD) including the EIA on Niksar HPP Finalized                                                                        | PIF prepared by third party Consultant Çinar Müh. Ltd.                            |
| October 4, 2007                | Local Stake Holder Consultation (LSC) Meeting held at the project site                                                                                  | The leaflet distributed on the date of LSC meeting                                |
| November 22, 2007              | EIA process not needed certification presented by the Ministry of Environment and Forestry (name changed as Ministry of Environment and Urban Planning) | The EIA certification                                                             |
| April 1, 2009                  | Feasibility Study Report (FSR)                                                                                                                          | FSR Prepared by third party Su Yapı                                               |
| June 19, 2009                  | Approval Letter for the revised Feasibility Study                                                                                                       | DSI Official Letter                                                               |
| September 17, 2009             | First Amendment made to the water usage agreement due to capacity increase                                                                              | Amendment to Water Usage Agreement                                                |
| October 28, 2009               | Final amendment made to the water usage agreement due to title of the owner changed to Niksar Enerji Üretim Ltd. Şti.                                   | Second Amendment to water usage agreement                                         |
| November 2, 2009               | Grid connection and Usage Agreement with TEIAS                                                                                                          | TEIAS Agreement relevant pages                                                    |
| November 11, 2009              | Final Amendment made and the title of the owner changed to Niksar Enerji Üretim Ltd. Şti.                                                               | EMRA license number EÜ/2303-1/1559                                                |
| December 15, 2009 <sup>1</sup> | EPC Contract Signed                                                                                                                                     | EPC Contract relevant Pages                                                       |
| December 16, 2009              | Loan agreement signed                                                                                                                                   | Loan agreement                                                                    |
| February 2, 2010               | Construction Start Date                                                                                                                                 | Correspondence of EPC contract parties.                                           |
| February 24, 2010              | The Electro Mechanical Equipment Purchase Contract Signed                                                                                               | EME Contract signed between EPC contractee and Voith Siemens Turbine Manufacturer |
| March 9, 2010                  | Forest Authority issued forest permit so that the land use can be changed and project can be implemented                                                | Forestry Permit Letter issued by Forest Authority                                 |
| March 10, 2010                 | The first payment made to the turbine provider                                                                                                          | Receipt of payment                                                                |
| May 23, 2012                   | Government Acceptance for the second unit to become operational,                                                                                        | Provisional Acceptance Protocol for unit 2                                        |
| June 8, 2012                   | Government Acceptance for the first unit to become operational                                                                                          | Provisional Acceptance Protocol for unit 1                                        |
| May 24, 2012                   | The date when the first amounts of electricity is exported to the host country grid.                                                                    | OSF Data Form                                                                     |

How the project activity is operating, and the boundary of the project activity (indicated in broken red line) is outlined in the following figures (Figure 2).

<sup>1</sup> Please note that the signing of the EPC contract is considered as the investment decision date.

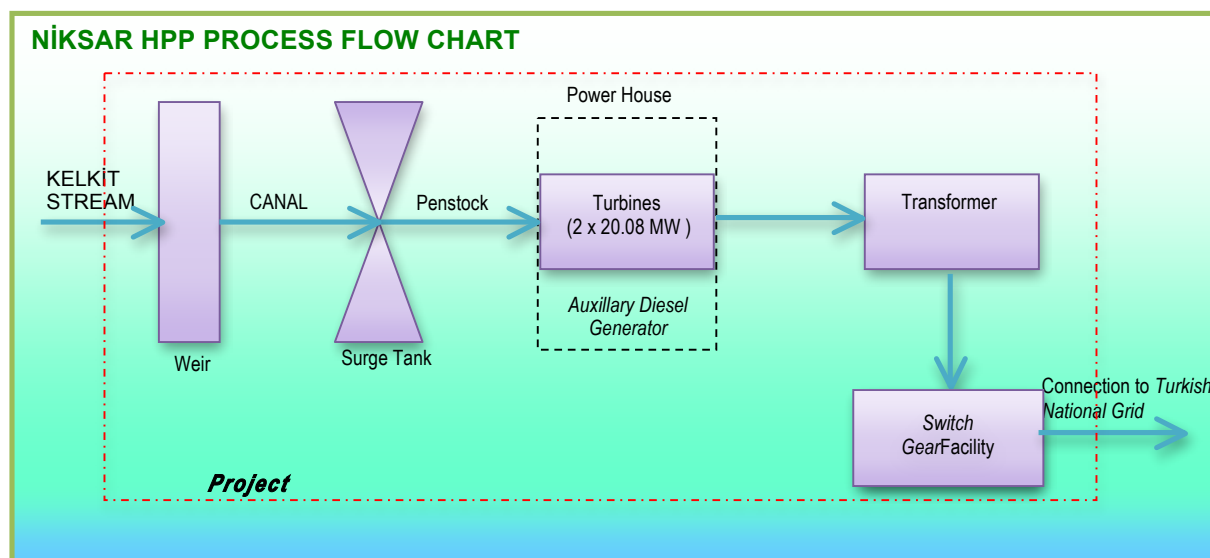


Figure 2: Flow chart showing the basic operational principles of the project activity, and the project boundary.

## 1.2 Sectoral Scope and Project Type

The project category is Sectoral Scope 1: Energy industries (renewable/-non -renewable sources). The project type is grid connected electricity generation from renewable sources. The project is a non-grouped, stand-alone project.

## 1.3 Project Proponent

| Project Proponent              | Role and Responsibility                       | Contact Information                                                                                                                               |
|--------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Niksar Enerji Üretim Ltd. Şti. | Project Owner – Implementation of the Project | Çetin Emeç Bulvarı 1364. Sok. No:4 Balgat/ANKARA<br>Tel : +90-312-285 83 63<br>Fax : +90-312-285 83 43<br>E-Mail: ufuk.akbulut@ictasenerji.com.tr |

## 1.4 Other Entities Involved in the Project

| Other Entities Involved                                                                     | Role and Responsibility                         | Contact Information                                                                                                    |
|---------------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Ekobil Çevre Hizmetleri Danışmanlık Eğt.Tar. Hayv.Mad. İnş. İth. İhr.Tur. ve Tic. Ltd. Şti. | Preparation of the Project Description Document | Güneykent Sitesi Ahlatlıbel Mahallesi 1839. Sk. No: 56 Çankaya-ANKARA<br>T:+90 312 489 13 38<br>E-mail:info@ekobil.com |

### 1.5 Project Start Date

The project start date is May 24, 2012.

### 1.6 Project Crediting Period

The project crediting period is 10 years: 24.05.2012-23.05.2022 (both days inclusive). The crediting period is renewable twice.

### 1.7 Project Location

The Project Activity is located on the Kelkit stream in Tokat province (Figure 3). The Project Activity is about 50 km from the city of Tokat, and about 10 km from the town of Niksar. The nearest residential areas include the villages of Arpaören, Yarbaşı, Hacılı, Kumçiftlik, Camidere and Korulu.

The coordinates of the major project components are given in the following table (Table 2).

Table 2: The location of the major project components

| Structure          | Latitude      | Longitude     |
|--------------------|---------------|---------------|
| Weir (Akıncı Weir) | 40°26'37.98"N | 37° 4'47.72"E |
| Powerhouse         | 40°29'27.38"N | 36°58'34.79"E |



Figure 3: The location of the project at the Google Earth satellite image (<http://goo.gl/maps/pFBJC>)

## 1.8 Title and Reference of Methodology

The following UNFFCC methodology and its related tools are utilized:

Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources." Version 13.0.0.

The Approved Methodology refers to the following tools:

"Tool for the demonstration and assessment of additionality" (Version 07.0.0; EB 70 -Annex 8 )

"Tool to calculate the emission factor for an electricity system". (Version 03.0.0;EB 70-Annex 22)

"Guidelines on the assessment of investment analysis" (Version 5; EB62-Annex 5)

## 2 IMPLEMENTATION STATUS

### 2.1 Implementation Status of the Project Activity

The project start date is 24 May 2012. Since that date, there is no special event that may have impact on monitoring of GHG emission reductions. The following table summarizes some significant dates related to this monitoring period:

**Table 3: Significant dates for the project monitoring period:**

| Date       | Milestone                                                                                                                                                  |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18.04.2013 | Final Validation Report                                                                                                                                    |
| 23.05.2012 | Date of commissioning of the Second unit of the Project and the project start date                                                                         |
| 24.05.2012 | First date when the electricity is supplied to the Turkish grid.                                                                                           |
| 06.06.2012 | Date of commissioning of the first unit                                                                                                                    |
| 10.04.2012 | Calibration date of meters (Main Meter 1-S.n. 53088751, Main Meter 2-S.n. 53088754 and the control meter-1-S.n. 53088752, control meter-2-S.n.: 53088753 ) |
|            | End of Calibration validity                                                                                                                                |
| 31.07.2013 | End of the first monitoring period                                                                                                                         |
| 13.05.2022 | End of first crediting period                                                                                                                              |

### 2.2 Project Description Deviations

The following parameters that are described as the monitoring parameters in the validated Project Description, are proposed to be omitted in the next verification:

#### *Reservoir Lake Area*

The reservoir area is calculated by the reservoir area maps. The maximum operation level for the project activity is 365 m. At this water level the reservoir area covers an area of 164,000 m2. This calculates a power density of 243.82 W/m2.

The power density of the project activity calculates as 166 W/m<sup>2</sup> at 367 m, a level that is considered to be impossible and insecure. Since it is observed that the project reservoir area is geographically bound by the topography, and since the excess water just spills off the height of the regulator, and considering the fact that the reservoir area was considered to be suitable to satisfy eligibility criteria., we propose that it is not anymore necessary to monitor this parameter. In the next monitoring period the Reservoir Lake area is suggested not to be monitored.

Project Capacity:

Since the project capacity is fixed by the installed turbines. It is not possible to observe a change in this parameter and therefore this parameter is proposed not to be monitored in the next verification period.

### **2.3      Grouped Project**

Niksar HPP is not a grouped project.

### 3 DATA AND PARAMETERS

#### 3.1 Data and Parameters Available at Validation

The following are the data and parameters available at validation:

|                                                                                               |                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | $FC_{i,y}$                                                                                                                                                                                                                                                                                |
| Data unit:                                                                                    | Volume Unit (cubic meter)                                                                                                                                                                                                                                                                 |
| Description:                                                                                  | Amount of fuel $i$ consumed by relevant power plants in Turkey in years, 2009, 2010, 2011.                                                                                                                                                                                                |
| Source of data:                                                                               | Official publications at the Turkish Electricity Transmission Company (TEİAŞ) Web Site<br>( <a href="http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/47.xls">http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/47.xls</a> ) |
| Measurement procedures (if any):                                                              | -                                                                                                                                                                                                                                                                                         |
| Monitoring frequency:                                                                         | Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation                                                                                                                |
| Value applied:                                                                                | Please see Annex 2-Table-1 in the validated PDD                                                                                                                                                                                                                                           |
| QA/QC Procedures                                                                              | -                                                                                                                                                                                                                                                                                         |
| Justification of choice of data or description of measurement methods and procedures applied: | Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.                                                         |
| Any comment:                                                                                  | Data used for the calculation of $EF_{grid,OM,Simple,y}$                                                                                                                                                                                                                                  |

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                | $NCV_{i,y}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Data unit:                       | GJ/Mass or Volume Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Description:                     | Net Calorific Values for fossil fuel type $i$ in year, <i>for the years</i> 2009, 2010 and 2011                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Source of data:                  | Regional or national average default values that are reliable and documented in national energy statistics of the Turkish Electricity Transmission Company Web Site<br>( <a href="http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/49.xls">http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/49.xls</a><br><a href="http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/47.xls">http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2011/yakit46-49/47.xls</a> ) |
| Measurement procedures (if any): | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Monitoring frequency:            | For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation<br>For BM: For the first crediting period, once for the <i>ex ante</i> and for the second and third crediting period, only once <i>ex ante</i> at the start of the second crediting period                                                                                                                                                                                 |
| Value applied:                   | Please see Annex-2-Table-5 in the validated PDD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| QA/QC Procedures                 | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Justification of choice          | Data used is taken from the TEİAŞ website, which is the website of the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                                                                       |                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| of data or description of measurement methods and procedures applied: | Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.                                                                                      |
| Any comment:                                                          | Data used for the calculation of $EF_{grid,OM,Simple,y}$ . As data on the NCV is not published directly on the TEİAŞ website, this data is calculated using the heating values of fuels and the volume or mass of fuels consumed for each year. |

|                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | $EF_{CO_2,i,y}$                                                                                                                                                                                                                                                                                                                                                                       |
| Data unit:                                                                                    | tCO <sub>2</sub> /GJ                                                                                                                                                                                                                                                                                                                                                                  |
| Description:                                                                                  | CO <sub>2</sub> emission factor of fossil fuel type <i>i</i> in year <i>y</i>                                                                                                                                                                                                                                                                                                         |
| Source of data:                                                                               | IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories                                                                                                                                                                                |
| Measurement procedures (if any):                                                              | -                                                                                                                                                                                                                                                                                                                                                                                     |
| Monitoring frequency:                                                                         | For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation<br>For BM: For the first crediting period, once for the <i>ex ante</i> and for the second and third crediting period, only once <i>ex ante</i> at the start of the second crediting period |
| QA/QC Procedures                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                     |
| Value applied:                                                                                | Please see Annex 2-Table-2 in the validated PDD.                                                                                                                                                                                                                                                                                                                                      |
| Justification of choice of data or description of measurement methods and procedures applied: | According to the “Tool to calculate the emission factor for an electricity system” version 03.0.0 , if values provided by the fuel supplier of the power plants in invoices or regional or national average defaults values are not available the IPCC default values at the lower limit of uncertainty must be used.                                                                 |
| Any comment:                                                                                  | Data used both for the calculation of $EF_{grid,OM,Simple,y}$ and $EF_{EL,m,y}$                                                                                                                                                                                                                                                                                                       |

|                                                                           |                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                         | $EG_y$                                                                                                                                                                                                                                                                                                                                                                                |
| Data unit:                                                                | MWh                                                                                                                                                                                                                                                                                                                                                                                   |
| Description:                                                              | Net electricity generated in the project electricity system in other words, net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year <i>y</i>                                                                                                                                     |
| Source of data:                                                           | Turkish Electricity Transmission Company Web Site<br><a href="http://www.teias.gov.tr/TurkiyeElektrikIstatistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls">http://www.teias.gov.tr/TurkiyeElektrikIstatistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls</a>                                                                                              |
| Measurement procedures (if any):                                          | -                                                                                                                                                                                                                                                                                                                                                                                     |
| Monitoring frequency:                                                     | For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation<br>For BM: For the first crediting period, once for the <i>ex ante</i> and for the second and third crediting period, only once <i>ex ante</i> at the start of the second crediting period |
| QA/QC Procedures                                                          | -                                                                                                                                                                                                                                                                                                                                                                                     |
| Value applied:                                                            | Please see Annex 2-Table 3 and Table 4 in the validated PDD.                                                                                                                                                                                                                                                                                                                          |
| Justification of choice of data or description of measurement methods and | Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to-date and reliable data available for the Turkish grid.                                                                                                                                                     |

|                     |                                                          |
|---------------------|----------------------------------------------------------|
| procedures applied: |                                                          |
| Any comment:        | Data used for the calculation of $EF_{grid,OM,Simple,y}$ |

|                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | $EG_{m,y}$                                                                                                                                                                                                                                                                                                                                                                            |
| Data unit:                                                                                    | MWh                                                                                                                                                                                                                                                                                                                                                                                   |
| Description:                                                                                  | Net electricity generated and delivered to the grid by power unit m in year y                                                                                                                                                                                                                                                                                                         |
| Source of data:                                                                               | Turkish Electricity Transmission Company Web Site ( <a href="http://www.teias.gov.tr">www.teias.gov.tr</a> ). Data is extracted from the relevant annexes of the capacity projection reports for the years 2011 <sup>2</sup> and 2012 <sup>3</sup> .                                                                                                                                  |
| Measurement procedures (if any):                                                              | -                                                                                                                                                                                                                                                                                                                                                                                     |
| Monitoring frequency:                                                                         | For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation<br>For BM: For the first crediting period, once for the <i>ex ante</i> and for the second and third crediting period, only once <i>ex ante</i> at the start of the second crediting period |
| QA/QC Procedures                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                     |
| Value applied:                                                                                | Please see Annex 2-Table 8 in the validated PDD.                                                                                                                                                                                                                                                                                                                                      |
| Justification of choice of data or description of measurement methods and procedures applied: | Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to-date and reliable data available for the Turkish grid.                                                                                                                                                     |
| Any comment:                                                                                  | Data used for the calculation of $EF_{grid,BM,y}$                                                                                                                                                                                                                                                                                                                                     |

|                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                                             | $\eta_{m,y}$                                                                                                                                                                                                                                                                                                                                                                                                      |
| Data unit:                                                                                    | -                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Description:                                                                                  | Average net energy conversion efficiency of power unit m in year y                                                                                                                                                                                                                                                                                                                                                |
| Source of data:                                                                               | The default values provided at the Annex 1 of the "Tool to calculate emission factor for an electricity sector (Version 03.0.0)" are used                                                                                                                                                                                                                                                                         |
| Measurement procedures (if any):                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Monitoring frequency:                                                                         | Once for the crediting period                                                                                                                                                                                                                                                                                                                                                                                     |
| QA/QC Procedures                                                                              | N/A as the default values provided in Annex 1 are used.                                                                                                                                                                                                                                                                                                                                                           |
| Value applied:                                                                                | Please see Annex 1 of the "Tool to calculate emission factor for an electricity sector (Version 03.0.0)" in the validated PDD                                                                                                                                                                                                                                                                                     |
| Justification of choice of data or description of measurement methods and procedures applied: | According to the "tool to calculate emission factor for an electricity system if documented manufacturer's specifications or data from the utility, the dispatch center or official records are not available then the default values given in annex 1 of the tool shall be used. The first two options are not available for the power plants supplying the Turkish grid, therefore the default values are used. |
| Any comment:                                                                                  | Data used for the calculation of $EF_{grid,BM,y}$                                                                                                                                                                                                                                                                                                                                                                 |

<sup>2</sup> <http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf>
<sup>3</sup> <http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf>

## 3.2 Data and Parameters Monitored

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                | EG <sub>PP-self consumption, y</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Data unit:                                                       | MWh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Description:                                                     | Quantity of electricity imported by the power plant from the Grid for self consumption, in year y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Measured /Calculated /Default:                                   | Measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Source of data:                                                  | The Primary source of data will be the two Main TEIAS meter readings recorded at the monthly reading protocols, the column related to electricity obtained from the Grid.<br>The secondary source of data will be the PMUM/MFRC web site screen shots, the column with the heading UEÇM <sup>4</sup> .                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Description of measurement methods and procedures to be applied: | Measurements are to be made by electricity meters that belong to the grid operator, TEİAŞ. The meters will be in compliance with the collected data. Data will be used to calculate the net electricity supplied to the grid,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Frequency of monitoring/recording:                               | Recorded continuously, read remotely by TEİAŞ, and reported monthly on TEİAŞ Meter Reading Protocols sent electronically to the project proponent, Reported annually on the VCS Monitoring Report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Value applied:                                                   | 144.53                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Monitoring equipment:                                            | Main Electricity Meter TR-1 ANA: Actaris SL 7000 Serial Number: 53088751<br>Main Electricity Meter TR-2 ANA: Actaris SL 7000 Serial Number: 53088752<br>Back-up Electricity Meter TR-1 MUKAYESE: Actaris SL 7000 Serial Number: 53088753<br>Back-up Electricity Meter TR-2 MUKAYESE: Actaris SL 7000 Serial Number: 53088754<br>All meters will be in compliance with the communiqué for Metering Devices to be used in the Electricity Market <sup>5</sup> . They have an accuracy class of Class02S indicating an accuracy range of 0.2%.                                                                                                                                                                                        |
| QA/QC procedures to be applied:                                  | Measurements will be carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The minimum accuracy of the meters are Class02S, that is to say should be within the $\pm 0.2\%$ ( $\pm 0.002$ ) range. The monthly reported meter readings by the main meters, will be cross-checked against the back up meters, if the reading difference is less than $\pm 0.002$ ( $\pm 0.2\%$ ) than the meter readings are considered to be OK, if not than the meters will be checked. The monthly reported readings will also be cross checked against the monthly PMUM/MFRC screen shots. The PMUM/MFRC data of electricity sales will also be a proof for quality and reliability of data. |
| Calculation method:                                              | <i>Direct continuous measurement</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Any comment:                                                     | Data will be used to calculate net electricity supplied to the grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

<sup>4</sup> UEÇM: Uzlaştırmaya Esas Çekim Miktarı-Amount of Electricity based on Reconciliation.

<sup>5</sup> The latest version of the communiqué (in Turkish) can be found in the following link: <http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44>

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                | EG <sub>PP-gross, y</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Data unit:                                                       | MWh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Description:                                                     | Quantity of electricity produced by the power plant , in y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Measured /Calculated /Default:                                   | Measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Source of data:                                                  | The Primary source of data will be the two main TEIAS meter recorded at the monthly reading protocols, the column related to gross electricity supplied to the Grid.<br>The secondary source of data will be the PMUM/MFRC web site screen shots, the column with the heading ISVM <sup>6</sup> .or the monthly electricity sales invoices, that indicate the monthly amount of electricity sold.                                                                                                                                                                                                                                                                                                                            |
| Description of measurement methods and procedures to be applied: | Measurements are to be made by electricity meters, that belong to the grid operator, TEİAŞ. The meters will be in compliance with the collected data. Data will be used to calculate the net electricity supplied to the grid,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Frequency of monitoring/recording:                               | Recorded continuously, read remotely and reported monthly on TEİAŞ Meter Reading Protocols that are sent to project proponent electronically, Reported annually on the VCS Monitoring Report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Value applied:                                                   | 265,937.91                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Monitoring equipment:                                            | Main Electricity Meter TR-1 ANA: Actaris SL 7000 Serial Number: 53088751<br>Main Electricity Meter TR-2 ANA: Actaris SL 7000 Serial Number: 53088752<br>Back-up Electricity Meter TR-1 MUKAYESE: Actaris SL 7000 Serial Number: 53088753<br>Back-up Electricity Meter TR-2 MUKAYESE: Actaris SL 7000 Serial Number: 53088754<br>All meters will be in compliance with the communiqué for Metering Devices to be used in the Electricity Market <sup>7</sup> . They have an accuracy class of Class02S indicating an accuracy range of 0.2%.                                                                                                                                                                                  |
| QA/QC procedures to be applied:                                  | Measurements will be carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The minimum accuracy of the meters are Class02, that is to say should be within the $\pm 0.2\%$ ( $\pm 0.002$ ) range. The monthly reported meter readings by the s meter will be cross-checked against the back up meters. if the reading difference is less than $\pm 0.002$ ( $\pm 0.2\%$ ) than the meter readings are considered to be OK, if not than the meters will be checked. The monthly reported readings will also be cross checked against the monthly PMUM/MFRC screen shots. The PMUM/MFRC data of electricity sales will also be a proof for quality and reliability of data. |
| Calculation method:                                              | Direct continuous measurement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Any comment:                                                     | Data will be used to calculate net electricity supplied to the grid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|                                |                                                                                               |
|--------------------------------|-----------------------------------------------------------------------------------------------|
| Data / Parameter:              | Cap <sub>PJ</sub>                                                                             |
| Data unit:                     | W                                                                                             |
| Description:                   | Installed capacity of the hydropower plants after the implementation of the Project Activity. |
| Measured /Calculated /Default: | Measured                                                                                      |

<sup>6</sup> ISVM: İletim Sistemine Veriş Miktarı-Amount Supplied to the Grid

<sup>7</sup> The latest version of the communiqué (in Turkish) can be found in the following link: <http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44>

|                                                                  |                                                                                                                        |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Source of data:                                                  | Project site computers with SCADA system and the turbine name plates.                                                  |
| Description of measurement methods and procedures to be applied: | Observed via the SCADA system of the Project Activity                                                                  |
| Frequency of monitoring/recording:                               | Once for each monitoring period                                                                                        |
| Value applied:                                                   | 40,161,000                                                                                                             |
| Monitoring equipment:                                            | SCADA system of the Project Activity                                                                                   |
| QA/QC procedures to be applied:                                  | Can be confirmed also by the parameter readings on the design plates of each turbine and by summing the two units.     |
| Calculation method:                                              | N/A                                                                                                                    |
| Any comment:                                                     | This parameter is monitored in this monitoring period, but is not going to be monitored in the next monitoring period. |

|                                                                  |                                                                                                                                                        |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data / Parameter:                                                | <b>A<sub>PJ</sub></b>                                                                                                                                  |
| Data unit:                                                       | m <sup>2</sup>                                                                                                                                         |
| Description:                                                     | Area of the reservoir measured in the surface of the water, after the implementation of the Project Activity, when the reservoir is full.              |
| Measured /Calculated /Default:                                   | Indirectly measured based on the reservoir area map provided in Annex 5.                                                                               |
| Source of data:                                                  | Surface area determined using the lake surface area map provided in Annex-5 of this PD.                                                                |
| Description of measurement methods and procedures to be applied: | The reservoir area corresponding to maximum operational level has been determined via the topographic map showing the lake area, presented in Annex 5. |
| Frequency of monitoring/recording:                               | Once during each monitoring period                                                                                                                     |
| Value applied:                                                   | 164,710                                                                                                                                                |
| Monitoring equipment:                                            | -                                                                                                                                                      |
| QA/QC procedures to be applied:                                  | Can be checked and compared to satellite imagery available by Google Earth.                                                                            |
| Calculation method:                                              | N/A                                                                                                                                                    |
| Any comment:                                                     | This parameter is monitored in this monitoring period, but is not going to be monitored in the next monitoring period.                                 |

### 3.3 Description of the Monitoring Plan

#### Objectives of the monitoring program

The Monitoring plan is developed to ensure that the Project Activity is well organized from the start in terms of the collection and archiving of complete and reliable data that is needed to ensure reliable and accurate measurements of actual emission reductions.

#### Data to be monitored

Given that the emission factor is calculated on an ex-ante basis, the first data to be monitored is the electricity net supplied to the grid.

The second data to be monitored is the installed capacity of the Project Activity. Using the SCADA system installed capacity will be measured automatically.

The third data to be monitored is the reservoir area of the Project Activity. The reservoir area corresponding to maximum operational level has been determined as a certain value according to the topographical maps. In order to make verification of the reservoir area, the reservoir lake can be visited during the verification site visit and be compared to the reservoir area map, presented in Annex 5.

## Monitoring procedures

The monitoring will be conducted by the Verified Emission Reduction (VER) Monitoring Team. The VER Team Members, and their position and duties for the monitoring is outlined in the following table (Table 17):

Table 4: Positions and responsibilities of the VER monitoring team members.

| Position                             | Responsibility                                                                                                                                                                                                |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Niksar HPP Manager                   | Day to day operation of the Niksar HPP,<br>Compliance of the project activity with the host country rules and regulations<br>Coordination of the data collection and recording for the VCS monitoring report. |
| Chief Electrical Technician          | Day to day follow up of electrical equipment<br>Recording and monitoring of the electricity generation data                                                                                                   |
| Accounts Manager based in Ankara HQ. | Data keeping for power sales<br>Keeping the track record of PMUM/MFRC data                                                                                                                                    |
| Chief Mechanical Technician          | Day to day operation of the power plant<br>Keeping records of malfunctions and repairs                                                                                                                        |
| Carbon Consultant                    | Emission reduction calculations<br>Scripting of the periodic monitoring report<br>Follow up of the verification process                                                                                       |

The power generation meter readings will be performed by using the main metering devices and the back-up metering devices for accuracy checks only. Data from metering devices will be recorded by TEİAŞ on monthly agreed protocols and will form the basis for invoicing and emissions calculations. In addition to the readings of the two metering devices, generation data of the Niksar HPP can be cross checked, via the TEİAŞ – PMUM web site (<http://pmum.teias.gov.tr>) which is accessible by a password available to the electricity generation companies. The monthly screen shot print outs of the PMUM data will be available to the verifying DOE during the verification process for cross checking. Electricity generation data at the Market Financial Reconciliation Centre (MFRC/PMUM) web page will exhibit the net electricity generated less transmission loss, to be able to produce comparable numbers, the figures taken from PMUM web site needs to be multiplied by the transmission loss factor of the grid.

## Monitoring equipment

### Electricity meters

The main and back-up electricity meters will be bi-directional for quantifying the electricity delivered by the Project Activity to the grid.

The meters will be in compliance with the standards of the Turkish Standards Institute and will have obtained a "Type and System Approval" certificate from the Ministry of Trade and Industry. In case there are modifications to the standards, the modified standard shall be valid; and in case a valid standard is cancelled or abolished, the new standard shall be valid. The standards that will be used are TS-620 EN 60044-1 and TS718 IEC60044.2 for main and back-up meters, respectively. The sensitivity of the main and secondary meters are  $CI = 0.2S$  for active and reactive energy. The meters shall be factory calibrated by the manufacturer before installation. Records of the meter (type, made, model and calibration documentation) will be retained in the quality control system.

## Data collecting and recording

I. The net electricity generation by the project activity. Based on the baseline scenario presented above, this amount of electricity would have been produced by the Turkish National Grid.

The electricity produced will be sold to TEİAŞ. Therefore, TEİAŞ measures the electricity produced by two main meters and two Back-up meters:

### A. Line 1 Meters:

- a. Main Electricity Meter: Actaris SL 7000 SL761: -Serial Number: 53088751
- b. Back-up Electricity Meter: Actaris SL 7000 SL761: -Serial Number: 53088752

### B. Line 2 Meters:

- a. Main Electricity Meter: Actaris SL 7000 SL761: -Serial Number: 53088753
- b. Back-up Electricity Meter: Actaris SL 7000 SL761: -Serial Number: 53088754

These meters are placed at the Power House. These meters will provide official data which will be read and recorded monthly by TEİAŞ officers for invoicing. TEİAŞ also conducts the calibration and maintenance of these meters and thus, ensures the accuracy and quality of the measurements. The quality standards that the meters need to comply is "The ICE/TSE 62053-22: Electricity metering equipment (a.c) – Particular requirements - Part 22: Static meters for active energy (Classes 0,2 S and 0,5 S)" The calibration of the meters are done and the meters will be checked continuously if there is a difference of  $\pm 0.2\%$  in the readings of the main and the back-up meters, the calibration is repeated.

At the end of each month, the monthly generation will be read remotely by a the Grid Operator and the plant manager to determine the invoiced generation amount. In case of failure of the main meter, control meter is used to determine the invoiced generation amount.

The net electricity produced ( $EG_{PP-net, y}$ ) in year y is calculated by subtracting the total electricity consumed by the hydroelectric power plant ( $EG_{PP-self\ consumption, y}$ ), from the gross electricity generation ( $EG_{PP-gross, y}$ ). After obtaining the net electricity production value, the emission

reductions will be calculated by multiplying the net electricity with the Ex-ante Combined Margin Emission Factor calculated above.

#### Measuring Installed Capacity

By means of the SCADA system established in the plant all kinds of technical parameters related with turbines and generators including installed capacity will be measured and stored in the system on real time basis. The installed capacity of the plant will be measured from SCADA once a year while the plant is operated with full load and the related data will be stored as per the monitoring program.

#### Measuring Reservoir Area

The reservoir area corresponding to maximum operational level has been determined based on the topographical map, presented in Annex 5.

#### Data management

The indices are read and recorded (by hand) hourly. The person who records the last entry of the day inputs all readings into an electronic spread sheet and then sends this report to HQ where it is being stored.

At the end of each month, electricity supplied to the grid will be entered into an electronic spread sheet titled raw data, so that it can be processed for verified emission reduction calculations. The data to be measured for installed capacity and reservoir area will be entered into an electronic spread sheet at the end of each year. The electronic files will be backed up on both hard drives and on a Compact Discs (CD).

#### Quality Control and Assurance (QC/QA)

All of the main and back-up meters are owned and installed by the grid operator, TEIAS. The Project Owner has signed an agreement with the grid operator to specify the QA procedure for measurement and calibration to ensure the measurement accuracy of the main and back-up meters are in compliance with national regulations. The Calibrations of the electricity meters are valid for the next 10 years after calibration,

The grid operator's Metering Officer should be notified of any failure of one of the meters. TEIAS is the only one entity, authorized to deal with fixing, calibrating, or changing the meters, which will be done either by the grid operator or by a company authorized by the grid operator. The Project Owner will keep electricity sale and purchase records, to which the recorded data will be compared.

All written documentation such as maps, drawings, the EIA and the Feasibility study, will be stored and will be made available to the verifier so that the reliability of the information may be checked.

All the data and documentation related to the verification will be archived for minimum two years after the end of the first crediting period.

## 4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 4.1 Baseline Emissions

The baseline emissions (BE<sub>y</sub>) are calculated based on the following formula a:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{Where:}$$

$$BE_y = \text{Baseline emissions in year } y \text{ (tCO}_{2/yr}\text{)}$$

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

$$EF_{grid,CM,y} = \text{Combined margin CO}_2 \text{ emissions factor in year } y \text{ (tCO}_2\text{/MWh)}$$

And

$$EG_{PJ,y} = EG_{PP-net, y}$$

$$EG_{PP-net, y} = \text{Quantity of net electricity generation supplied by the project plant to the grid in year } y \text{ (MWh/y)}$$

The Combined margin CO<sub>2</sub> emissions factor in year y (tCO<sub>2</sub>/MWh), EF<sub>grid,CM,y</sub>, is fixed ex-ante for the duration of the crediting period, and is 0.5332 tCO<sub>2</sub>e/MWh.

The following table shows the original data as reported in the monthly meter reading records, which are the result from a joint meter reading by TEIAS and Niksar HPP staff at the end of each month. The meter reading records are followed remotely over the internet by parties and serve as basis for all sub-sequent processes, especially settlement and billing for electricity supplied to the grid. The collected data is kept by Niksar Enerji Üretim Ltd. Şti. during the crediting period and until two years after the last issuance of VCUs for the Niksar HPP project activity for the crediting period under consideration.

Table 5: Baseline Emissions (24 May 2012 to 31 July 2013-Both days inclusive)

|                                                 |           | A-Gross Electricity Production | B-Self Electricity Consumption | C-Net electricity production C=A-B | Baseline Emissions = $EG_{PP-net,y} * EF_{CM}$ | National Grid Emission Factor |
|-------------------------------------------------|-----------|--------------------------------|--------------------------------|------------------------------------|------------------------------------------------|-------------------------------|
|                                                 | Symbol    | $EG_{PP-gross,y}$              | $EG_{PP-self consumption,y}$   | $EG_{PP-net,y}$                    | BE1                                            | $EF_{CM}$                     |
| Y<br>E<br>A<br>R                                | Units     | MWh                            | MWh                            | MWh                                | tCO <sub>2</sub> e                             | tCO <sub>2</sub> e/MWh        |
| 2012                                            | May       | 3,791.10                       | 19.94                          | 3,771.16                           | 2,010.90                                       | 0.53323                       |
|                                                 | June      | 17,044.07                      | 4.97                           | 17,039.10                          | 9,085.76                                       |                               |
|                                                 | July      | 14,970.89                      | 13.80                          | 14,957.09                          | 7,975.57                                       |                               |
|                                                 | August    | 13,504.93                      | 16.93                          | 13,488.00                          | 7,192.21                                       |                               |
|                                                 | September | 14,745.66                      | 12.15                          | 14,733.51                          | 7,856.35                                       |                               |
|                                                 | October   | 11,726.57                      | 22.97                          | 11,703.60                          | 6,240.71                                       |                               |
|                                                 | November  | 16,527.13                      | 13.45                          | 16,513.68                          | 8,805.59                                       |                               |
|                                                 | December  | 21,753.68                      | 5.34                           | 21,748.34                          | 11,596.87                                      |                               |
| Total in 2012 (24 May 2012 to 31 December 2012) |           |                                |                                |                                    |                                                | 60,764                        |
| 2013                                            | January   | 26,394.80                      | 0.12                           | 26,394.68                          | 14,074.44                                      |                               |
|                                                 | February  | 24,124.70                      | 0.17                           | 24,124.53                          | 12,863.92                                      |                               |
|                                                 | March     | 27,024.93                      | 1.84                           | 27,023.09                          | 14,409.52                                      |                               |
|                                                 | April     | 25,831.89                      | 0.22                           | 25,831.67                          | 13,774.22                                      |                               |
|                                                 | May       | 20,137.02                      | 3.76                           | 20,133.26                          | 10,735.66                                      |                               |
|                                                 | June      | 17,272.77                      | 3.78                           | 17,268.99                          | 9,208.34                                       |                               |
|                                                 | July      | 11,087.77                      | 25.09                          | 11,062.68                          | 5,898.95                                       |                               |
| Total in 2013 (1 January to 31 July, 2013)      |           |                                |                                |                                    |                                                | 80,965                        |
| Grand Total                                     |           | 265,937.91                     |                                |                                    | 141,729                                        | 141,729                       |

## 4.2 Project Emissions

As the methodology states the P<sub>EH</sub> in case of a hydro power project will be calculated:

"Emissions from water reservoirs of hydro power plants (P<sub>EH,y</sub>)

*For hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH<sub>4</sub> and CO<sub>2</sub> emissions from the reservoir, estimated as follows:"*

"...the power density of the project activity (PD) is greater than 4 W/m<sup>2</sup> and less than or equal to 10 W/m<sup>2</sup>:"

|              |   |                                  |   |                                   |                         |
|--------------|---|----------------------------------|---|-----------------------------------|-------------------------|
| Capacity (W) | / | Reservoir Area (m <sup>2</sup> ) | = | Power Density (W/m <sup>2</sup> ) | >10 (W/m <sup>2</sup> ) |
| 40,160,000   | / | 164,710                          | = | 243.8                             | >10 (W/m <sup>2</sup> ) |

The project has a power density of 243.8 W/m<sup>2</sup> therefore

$$PE_{HP,y} = 0$$

Where:

$PE_{HP,y}$  Project emissions from water reservoirs (tCO<sub>2</sub>e/yr)

Although there is an emergency/back up diesel generator installed within the project boundary, the emissions from these have been deemed negligible as per the ACM0002 (version 13.0.0) methodology, since it will be solely utilized in case of an emergency, such as a power outage.

### 4.3 Leakage

There are no leakage emissions related to project activity

### 4.4 Summary of GHG Emission Reductions and Removals

Since the project emissions are equal to zero, and the leakage equals also zero, the emission reductions in 2012, and 2013 are equal to the corresponding baseline emissions.

Below table (Table 6) provides a summary of the GHG emission reductions and removals:

Table 6: A summary of the GHG emission reductions by the project activity.

|                                           |                  |                        | VER01                   |                       |
|-------------------------------------------|------------------|------------------------|-------------------------|-----------------------|
| Data                                      | Symbol           | Units                  | 2012                    | 2013                  |
| Net electricity generated                 | E1               | MWh                    | 113,954.48              | 151,838.90            |
| National Grid Emission Factor             | EF <sub>CS</sub> | tCO <sub>2</sub> e/MWh | 0.533                   | 0.533                 |
| Baseline Emissions                        | Symbol           | Units                  | 2012                    | 2013                  |
| Niksar HPP Prod.. = E1 * EF <sub>CS</sub> | BE1              | tCO <sub>2</sub> e     | 60,763.95               | 80,965.06             |
| Project Emissions                         | Symbol           | Units                  | 2012                    | 2013                  |
| N/A                                       | PE               | tCO <sub>2</sub> e     | 0                       | 0                     |
| Leakage                                   | Symbol           | Units                  | 2012                    | 2013                  |
| N/A                                       | LE               | tCO <sub>2</sub> e     | 0                       | 0                     |
| Emission Reductions                       | Symbol           | Units                  | 2012<br>(24.5 to 31.12) | 2013<br>(1.1 to 31.7) |
| = BE1 - PE - LE                           | ER               | tCO <sub>2</sub> e     | 60,763.95               | 80,965.06             |
| TOTAL ERs                                 |                  |                        | 141,729                 |                       |

## 5 ADDITIONAL INFORMATION

- At the first month of data recording (by 24 May 2012 to 31 May 2012) the data was not recorded to the meter reading protocols, therefore that data is retrieved by checking other recorded sources such as the first meter reading protocol, and its consistency is checked with the remote meter reading system data and PMUM/MFRC data and its consistency is shown.
- In the second month of data monitoring while the first unit was being commissioned (on June 6<sup>th</sup>, 2012), it was observed that the data transfer card of the control unit for unit 1 was not working, this problem was overcome by TEİAŞ switching the main meter for line 1 with the control meter for line 2. This event is well documented and recorded, and it didn't have an impact over the consistency or reliability of the data.