



# Verified Carbon Standard

## MONITORING REPORT TITLE

Document Prepared by GAIA Climate Consultant

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# CONTENTS

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<b>1</b>	<b>PROJECT DETAILS.....</b>	<b>3</b>
1.1	Summary Description of the Implementation Status of the Project .....	3
1.2	Sectoral Scope and Project Type .....	6
1.3	Project Proponent .....	6
1.4	Other Entities Involved in the Project .....	7
1.5	Project Start Date .....	7
1.6	Project Crediting Period .....	7
1.7	Project Location .....	7
1.8	Title and Reference of Methodology .....	10
1.9	Participation under other GHG Programs.....	10
1.10	Other Forms of Credit.....	10
1.11	Sustainable Development.....	11
<b>2</b>	<b>SAFEGUARDS .....</b>	<b>11</b>
2.3	AFOLU-Specific Safeguards .....	13
<b>3</b>	<b>IMPLEMENTATION STATUS .....</b>	<b>13</b>
3.1	Implementation Status of the Project Activity .....	13
3.2	Deviations .....	14
3.3	Grouped Projects .....	14
<b>4</b>	<b>DATA AND PARAMETERS.....</b>	<b>15</b>
4.1	Data and Parameters Available at Validation .....	15
4.2	Data and Parameters Monitored.....	20
4.3	Monitoring Plan.....	24
<b>5</b>	<b>QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS .....</b>	<b>27</b>
5.1	Baseline Emissions .....	27
5.2	Project Emissions .....	28
5.3	Leakage.....	29
5.4	Net GHG Emission Reductions and Removals.....	29
	<b>APPENDIX 1: &lt;RESERVOIR AREA MAP&gt; .....</b>	<b>34</b>

# 1 PROJECT DETAILS

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

Sanibey Dam & HEPP is comprised of the construction of a dam and a greenfield 310.66 MWe hydroelectric power plant located in the Seyhan river basin, in Turkey's Eastern Mediterranean Region. The objective of the Sanibey Dam and Hydroelectric Power Plant (Sanibey Dam & HEPP) is to generate electricity and supply it into the public grid. Due to its significant contribution to climate change mitigation and sustainable development in the region, this project fulfills the requirements of VCS rigorously.

The project activity was originally developed under the name of "Yedigoze Dam & HEPP" by Yedigoze Elektrik Uretim ve Ticaret A.S. In parallel with the demand of executive board members, both the company name and consequently the name of the project have recently been changed to "Sanibey Baraji Elektrik Uretim ve Ticaret A.S." and "Sanibey Dam & HEPP"<sup>1</sup> respectively. The board decision was taken on 08/06/2011 with decision number 13. The Board decision was later published in the Turkish Trade Registry Gazette on 16/08/2011 (No: 7881). Finally, Sanibey Baraji Elektrik Uretim ve Ticaret A.S. has been transferred to SANKO ENERJI SANAYI VE TICARET A.S. on 28/09/2012.<sup>2</sup>

In order to generate energy, a dam, having a body of concrete faced rockfill and a HEPP have been constructed. Generally describing; a spillway is located on the left bank of the river-bed; also energy structures consisting of two penstocks and a power plant building including two units having outputs of 155.33 MWe each are located on the downstream of the dam body. Besides, diversion structures containing two tunnels one of which is used as a sluiceway outlet and the second one is containing valve house are located on the left bank.

The turbine and generator manufacturer are Alstom. The manufacturer is a French company, acclaimed for its integrated power plants, power production services and air quality control systems. Alstom has been selected as the equipment provider because of its reliable quality products and technology, which is a grid friendly technology with low maintenance needs as well as low noise and low environmental impacts. Within the scope of the project activity, there has been no dam or any new reservoir formation that will have an impact on the project emissions during the monitoring period.

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<sup>1</sup> The project activity was originally developed under the name of "Yedigoze Dam & HEPP" and in the current license, it is still referred to as Yedigoze HEPP. According to the Turkish Trade Registry Gazette dated October 3<sup>rd</sup>, 2012 (No:8166), registered PDD and initial verification report the name of the project has been changed to "Sanibey Dam & HEPP". The relevant documents have been provided to the DOE separately.

<sup>2</sup> The Turkish Trade Registry Gazette has been provided to the DOE.

The project contributes positive environmental benefits as displacing the electricity generated by fossil fuel-fired power plants by utilizing renewable resources so as to avoid environmental pollution and GHG emissions. Thus, the project has a significant contribution to climate protection and to sustainable development in the region.

This monitoring period is from 01 June 2012 to 28 February 2018. During this monitoring period, the actualized net electricity generation is 4,203,448.63 MWh. The total emission reduction of this monitoring period is 2,282,048 tCO<sub>2</sub>e. Please see the vintage-based comparison of expected and achieved emission reductions for this monitoring period:

Vintage	Total Days	Expected amount of net GHG removals (t CO <sub>2</sub> e)	Amount achieved during this monitoring period (tCO <sub>2</sub> e)	Expected net electricity generation (MWh)	Amount achieved during this monitoring period (MWh)	Difference (%)
01/06/2012-31/12/2012	214	307,649	230,753	566,677.86	425,038.81	-%25
01/01/2013-31/12/2013	365	524,729	383,952	966,530.00	707,224.31	-%27
01/01/2014-31/12/2014	365	524,729	269,115	966,530.00	495,700.68	-%49
01/01/2015-31/12/2015	365	524,729	572,720	966,530.00	1,054,928.61	%9
01/01/2016-31/12/2016	365	524,729	353,741	966,530.00	651,578.45	-%33
01/01/2017-31/12/2017	365	524,729	380,281	966,530.00	700,462.87	-%28
01/01/2018-28/02/2018	59	84,819	91,486	156,233.62	168,514.90	%8
<b>Total</b>	<b>2,099</b>	<b>3,016,114</b>	<b>2,282,048</b>	<b>5,555,561.48</b>	<b>4,203,448.63</b>	<b>-%24</b>

Table 1: Ex-ante vs achieved emission reductions

Considering the difference between the amount achieved in this monitoring period and the ex-ante amount, lower than expected precipitation resulted in lower production. According to the official records published by the General Directorate of Meteorology, annual areal precipitation in the Mediterranean Region, where the project is located, is higher in 2015.<sup>3</sup>

Therefore, emission reductions for 2015 are higher than for other years.

<sup>3</sup> <http://212.174.109.9/FILES/arastirma/yagis-degerlendirme/2015-2016alansal.pdf> (page: 15, Figure 18)

The following table shows a full detail of the project's technical specifications:

<b>Dam and Cofferdams</b>		
Type		Concrete Faced Rock Fill
Height above Thalweg	M	105
Height above Foundation	M	130
Crest Width	M	8
Crest Length	M	400
Crest Elevation	M	240
<b>Diversion and Bottom Outlet</b>		
Type of Cross Section		Circular
Diameter	M	8
Length	M	891; 850
Number of Units		2
<b>Spillway</b>		
Type		Radial
Sill Elevation		221.5
Maximum Capacity of Spillway	m <sup>3</sup> /s	9,000
<b>Penstock</b>		
Type		Above ground
Number of Units		2
Diameter	M	6.3
Length	M	393;382
<b>Power Plant Building</b>		
Type		On the ground
Height	M	58.5
Length	M	65.3
Width	M	48.65

<b>Turbines</b>		
Brand		Alstom Power Systems
Type		Vertical Francis Turbine
Number of Units		2
Serial No of Units		AHT YED 01/AHT YED 02
Unit Rated Power	kW	158,500
Total Installed Capacity	kW	310,660
<b>Transformer</b>		
Type		Outdoor Type, oily, three phased
Number of Units		3
Power of a Unit	MVA	175
Voltage	kV	14.4/380

Table 2: Sanibey HEPP's Technical properties

The project was commissioned in two phases. The first phase started on 2nd December 2010 while the second phase started on 26th January 2011.

## 1.2 Sectoral Scope and Project Type

The respective sectoral scope is scope 1: "Energy Industry – Renewable/Non-renewable Sources".

The project is not a grouped project.

## 1.3 Project Proponent

<b>Organization name</b>	SANKO ENERJI SANAYI VE TICARET. A.S.
<b>Contact person</b>	Ferudun İtergen
<b>Title</b>	Deputy General Manager
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<b>Email</b>	<a href="mailto:ferudun.itergen@sankoenerji.com.tr">ferudun.itergen@sankoenerji.com.tr</a>

#### 1.4 Other Entities Involved in the Project

<b>Organization name</b>	GAIA Climate Consultant
<b>Role in the Project</b>	Project Coordinator
<b>Contact person</b>	Gamze Karaca
<b>Title</b>	Carbon Consultant
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#### 1.5 Project Start Date

The project start date is 02/12/2010 which the project commenced electricity production.

#### 1.6 Project Crediting Period

The crediting period of the project begins with the commissioning of the plant. The Project's total crediting period is ten years renewable twice. The project started to generate electricity on 02/12/2010. Thus, the first crediting period shall last from the 2<sup>nd</sup> of December 2010 until 1<sup>th</sup> of December 2020.

#### 1.7 Project Location

The Project site is located in the Seyhan river basin in Turkey, in Eastern Mediterranean Region, in the boundaries of Imamoglu and Aladag district, Adana province; the project is located 37° 23' 52" N-35° 26' 17" E coordinates.<sup>4</sup> The following figures show the project's location.

<sup>4</sup> Google Earth screenshot of the coordinates has been provided to the DOE.



Figure 1: Satellite image of the Project

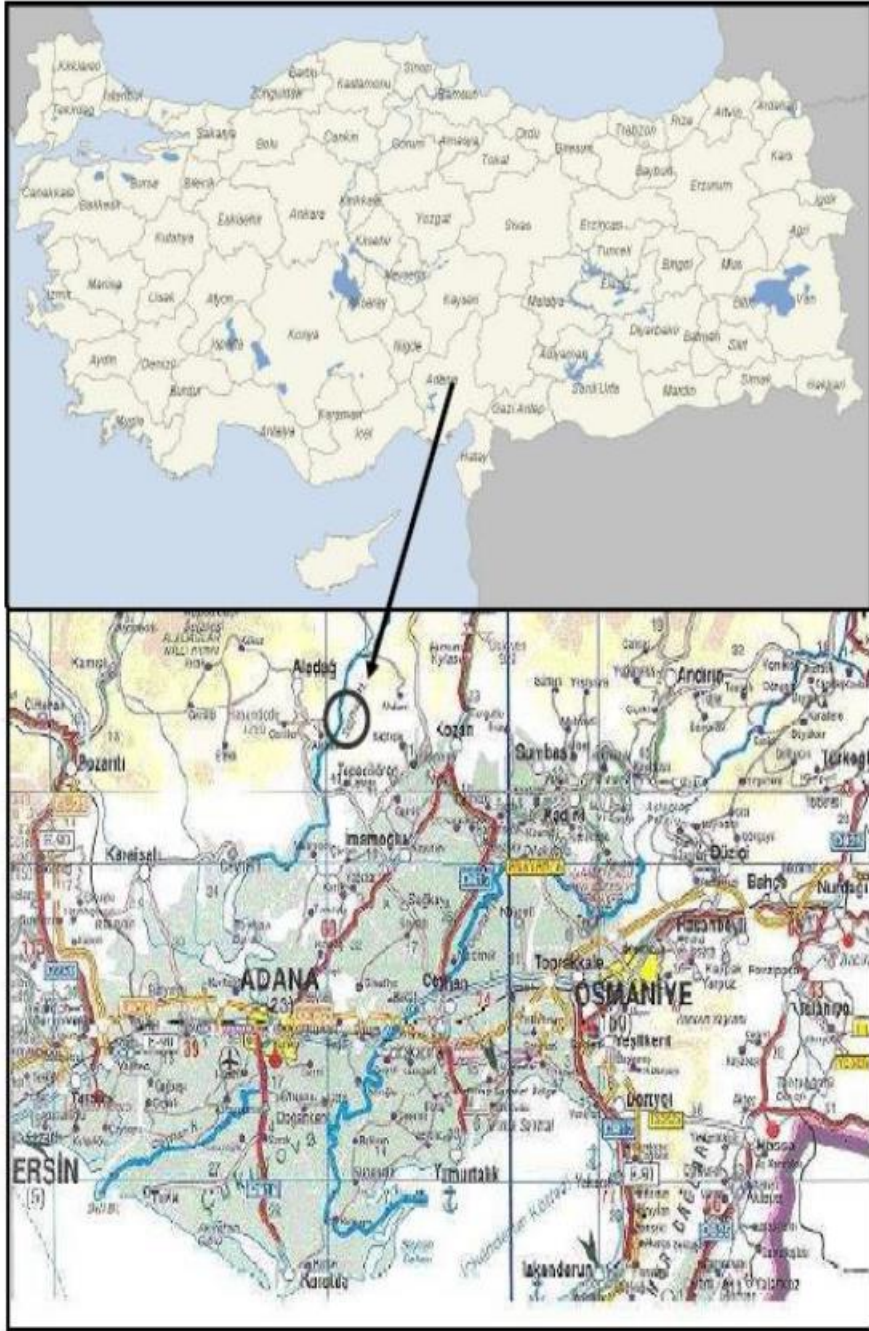


Figure 2: Project Location



Figure 3: Plant Layout

## 1.8 Title and Reference of Methodology

Approved consolidated baseline and monitoring methodology ACM0002/Version 12.1.0: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” was applied.<sup>5</sup> For the purpose of calculating the emission factor of the Turkish electricity grid, “Tool to calculate emission factor for an electricity system”, Version 02<sup>6</sup> was applied. The project’s additionality has been demonstrated using the version of “Tool for the demonstration and assessment of additionality, Version 05.2”<sup>7</sup>

## 1.9 Participation under other GHG Programs

The project has not been registered or seeking registration under other GHG programs.<sup>8</sup>

## 1.10 Other Forms of Credit

The project has not created another form of Credit.<sup>9</sup>

<sup>5</sup><https://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNV3LTK1BP3OR24Y5L/view.html>

<sup>6</sup> <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v2.pdf>

<sup>7</sup> <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v5.2.pdf>

<sup>8</sup> The relevant declaration letter has been submitted to the DOE.

<sup>9</sup> The relevant declaration letter has been submitted to the DOE.

## 1.11 Sustainable Development

The project helps Turkey to stimulate and commercialise the use of grid-connected renewable energy technologies and markets. Furthermore, the project demonstrates the viability of grid-connected hydro plants which can support improved energy security, improved air quality, alternative sustainable energy futures, improved local livelihoods and sustainable renewable energy industry development.

The specific goals of the project are to:

### SDG-7 Clean and Affordable Energy

The project contributes to the Sustainable Development Goal, Affordable and Clean Energy. During this monitoring period, the actualized net electricity generation is 4,203,448.63 MWh.

### SDG-8 Decent Work and Economic Growth

The project contributes to the Sustainable Development Goal, Decent Work and Economic Growth. Employment opportunities were provided for 30 personnel during the operation phase of the project.<sup>10</sup>

### SDG-13 Climate Action

The project contributes to the Sustainable Development Goal, Climate Action. During this monitoring period, the actualized emission reduction is 2,282,048 tCO<sub>2</sub>e.

# 2 SAFEGUARDS

## 2.1 No Net Harm

There isn't any negative environmental or socio-economic impact. Also, in line with Turkish environmental regulations, an "Environmental Impact Assessment (EIA) Report" had been carried out and EIA Positive Decision was approved by the Ministry of Environment and Forestry in 06/06/2007.<sup>11</sup>

## 2.2 Local Stakeholder Consultation

During the registration of the project, the Local Stakeholder Consultation meeting was held on 12/12/2006 in the conference room of the Akoren Municipality building in Aladag district

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<sup>10</sup> The social security records of employees have been submitted to the DOE.

<sup>11</sup> Positive EIA Letter has been submitted to the DOE.

of Adana province. The purpose of the meeting was to inform the public and stakeholders about the plan and present and discuss the social and environmental impacts of the project. Announcements were published in two newspapers (Zirve Newspaper on 06.12.2006 and Vatan Newspaper on 04.12.2006) –one national and one local- declaring the date, time, venue and topic of the meeting. Apart from this kind of invitation other stakeholders were invited by local announcements such as announcements done on village coffeehouse and in newspapers. All possible stakeholders were tried to be contacted via different kinds of communication ways such as sending letters to the invitees and local announcements. The meeting which started at 14:00 under the chairmanship of the Adana Provincial Directorate of Environment and Forestry received broad participation. All the aspects of the project including the socio-economic and environmental aspects were presented to the participants by a project developer representative and were discussed by the stakeholders. Clarifications were requested and the overall response to the project was encouraging and positive. All the hearings were held in Turkish. The participants are comprised of representatives from the community, relevant municipalities, public institutions and organizations, scientists, and inhabitants of the surrounding villages. It was observed that public and local authorities gave support for the implementation of the Sanibey Dam and HEPP Project.

During this monitoring period; a site visit including the stakeholder engagement procedure was conducted on 10/01/2020. Ten people including mukhtars of Eđner, Ulucinar and Boztahta villages and six local stakeholders were interviewed. All of these people are from local villages around the plant. There were not any negative feedbacks on socio-economic and environmental issues by the locals. Locals stated that they are happy with the project since Sanibey HEPP provided employment opportunities for local people. Since there were no negative feedbacks from the locals, there is no need to take any further action.

Also, mukhtars (head of the village) of Eđner, Ulucinar and Boztahta villages had already taken the contact information of the Plant Manager of the company so that the local stakeholders can reach Plant Manager whenever they have any complaints, suggestions, or ideas about the project. Stakeholders convey their requests and objections to the project owner by phone or individual application or local public meetings with a form.<sup>12</sup> Since mukhtars are the head of the villages, they are the main contact persons between the project owner and the local stakeholders. Mukhtars make sure that there's continuous communication between the two parties.

There is no update or any change to the project design after the registration of the project.

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<sup>12</sup> The complaint and request form have been submitted as proof documents to the DOE.

## 2.3 AFOLU-Specific Safeguards

N/A

# 3 IMPLEMENTATION STATUS

## 3.1 Implementation Status of the Project Activity

The construction of the project started on 01.07.2007. The first unit started operation on 2 December 2010. The second unit was commissioned on 26 January 2011. The project activity was initially developed under the name of “Yedigoze Dam & HEPP” by Yedigoze Elektrik Uretim ve Ticaret A.S. In parallel with the demand of executive board members, both the company name and consequently the name of the project had been changed to “Sanibey Baraji Elektrik Uretim ve Ticaret A.S.” and “Sanibey Dam & HEPP” respectively. The board decision was taken on 08/06/2011 with decision number 13. The Board decision was later published in the Turkish Trade Registry Gazette on 16/08/2011 (No: 7881). Finally, Sanibey Baraji Elektrik Uretim ve Ticaret A.S. has been transferred to SANKO ENERJI SANAYI VE TICARET A.S. on 28/09/2012.<sup>13</sup> Similarly, the shareholder structure was changed on 28/09/2012 and the Project has been transferred to SANKO ENERJI SANAYI VE TICARET A.S. The sole Project Proponent is SANKO ENERJI SANAYI VE TICARET. A.S.

Please see the table below for the important dates for the implementation of the project activity:

Milestone	Date
Stakeholder consultation	12/12/2006
Financial analysis of the project	05/12/2006
First VER consideration	05/12/2006
Investment Decision	25/12/2006
Feasibility report	November 2007
Contract signature for the construction-point of no return	01/07/2007
Start of construction	01/07/2007

<sup>13</sup> The Turkish Trade Registry Gazette has been provided to the DOE.

EIA approval (by the Ministry of Environment and Forestry)	06/07/2007
Contract signature for the equipments	20/03/2008
Loan signature	03/09/2008
Contract with a PDD consultant	01/02/2011
Contact with a DOE	August 2011
Commissioning date of the first unit	02/12/2010
Commissioning date of the second unit	26/01/2011
1 <sup>st</sup> Monitoring Period	02/12/2010-31/05/2012
2 <sup>nd</sup> Monitoring Period	01/06/2012-28/02/2018

Table 3: Project Timeline

The registration of the project was carried out by GAIA Carbon Finance. However, during this monitoring period, the name of the Carbon Consultant has changed to the GAIA Climate Consultant.

## 3.2 Deviations

### 3.2.1 Methodology Deviations

No deviation in the methodology has been applied to the project activity during the monitoring period.

### 3.2.2 Project Description Deviations

There are no project description deviations applied during this monitoring period. The current situation regarding the project owner and other organizations involved in the project has been included in Section 3.1.

## 3.3 Grouped Projects

This is not a grouped project.

## 4 DATA AND PARAMETERS

### 4.1 Data and Parameters Available at Validation

<b>Data / Parameter</b>	<b>EG<sub>gross,y</sub></b>
<b>Data unit</b>	GWh
<b>Description</b>	Turkey's Gross Electricity Generated by primary energy source for the five most recent years (2005 - 2009).
<b>Source of data</b>	Turkish Electricity Transmission Company (TEIAS) <a href="http://www.teias.gov.tr/istatistik2009/32(75-09).xls">http://www.teias.gov.tr/istatistik2009/32(75-09).xls</a>
<b>Value applied</b>	Validated VCS Project Description (Version 08) of the Project, Section 2.4
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, providing the most up-to-date and accurate information available.
<b>Purpose of Data</b>	Used for baseline emission calculation.
<b>Comments</b>	

<b>Data / Parameter</b>	<b>Cap<sub>BL</sub></b>
<b>Data unit</b>	W
<b>Description</b>	Installed capacity of the hydro power plant after the implementation of the project activity
<b>Source of data</b>	Project site
<b>Value applied</b>	0 (this is a new hydro power plant)
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	N/A

<b>Purpose of Data</b>	Calculation of project emissions
<b>Comments</b>	

<b>Data / Parameter</b>	<b>A<sub>BL</sub></b>
<b>Data unit</b>	m <sup>2</sup>
<b>Description</b>	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m <sup>2</sup> ).
<b>Source of data</b>	Project site
<b>Value applied</b>	0 (this is a new hydro power plant)
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	N/A
<b>Purpose of Data</b>	Calculation of project emissions
<b>Comments</b>	

<b>Data / Parameter</b>	<b>FC<sub>i,y</sub></b>
<b>Data unit</b>	Ton (m <sup>3</sup> for Natural Gas)
<b>Description</b>	Amount of fossil fuel type i consumed in the project electricity system in year y
<b>Source of data</b>	Turkish Electricity Transmission Company (TEIAS) <a href="http://www.teias.gov.tr/istatistik2009/43.xls">http://www.teias.gov.tr/istatistik2009/43.xls</a> <a href="http://www.teias.gov.tr/istatistik2009/44.xls">http://www.teias.gov.tr/istatistik2009/44.xls</a>
<b>Value applied</b>	Validated VCS Project Description (Version 08) of the Project, Section 2.4
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, providing the most up-to-date and accurate information available. Therefore, the uncertainty for the data is low.
<b>Purpose of Data</b>	To calculate the Operating Margin (OM) emission factor
<b>Comments</b>	-

<b>Data / Parameter</b>	<b>NCV</b>
<b>Data unit</b>	TJ/Ton (TJ/m <sup>3</sup> for Natural Gas)
<b>Description</b>	Net calorific value of fossil fuel type
<b>Source of data</b>	TEIAS website: "Heating Values of Fuels Consumed in Thermal Power Plants in Turkey by the Electric Utilities" 2007-2009: <a href="http://www.teias.gov.tr/istatistik2009/46.xls">http://www.teias.gov.tr/istatistik2009/46.xls</a>
<b>Value applied</b>	Validated VCS Project Description (Version 3) of the Project, Annex 7
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, providing the most up-to-date and accurate information available.
<b>Purpose of Data</b>	To calculate the Operating Margin (OM) emission factor
<b>Comments</b>	The conversion factor of 4.187 Joules/Cal is used

<b>Data / Parameter</b>	<b>EF<sub>CO<sub>2</sub>,i,y</sub></b>
<b>Data unit</b>	tCO <sub>2</sub> /MWh
<b>Description</b>	Default CO <sub>2</sub> emission factor of fossil fuel type i
<b>Source of data</b>	IPCC default values (as provided in Table 1.4, Chapter 1, Volume 2 (Energy), 2006 IPCC) <a href="http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf">http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf</a>
<b>Value applied</b>	Validated VCS Project Description (Version 08) of the Project, Section 2.3
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	There is no information on the fuel specific default emission factor in Turkey. Hence, IPCC values have been used as per the "Tool to calculate the emission factor for an electricity system (version 02)".
<b>Purpose of Data</b>	Used for baseline emission calculation.
<b>Comments</b>	

<b>Data / Parameter</b>	<b>Electricity Imports</b>
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<b>Data unit</b>	GWh
<b>Description</b>	Electricity imported to the Grid from other countries
<b>Source of data</b>	Turkish Electricity Transmission Company (TEIAS)
<b>Value applied</b>	<a href="http://www.teias.gov.tr/istatistik2008/23.xls">http://www.teias.gov.tr/istatistik2008/23.xls</a> <a href="http://www.teias.gov.tr/istatistik2009/23.xls">http://www.teias.gov.tr/istatistik2009/23.xls</a>
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, hence providing the most up-to-date and accurate information available.
<b>Purpose of Data</b>	To calculate the Operating Margin (OM) emission factor
<b>Comments</b>	

<b>Data / Parameter</b>	<b>Electricity capacity additions</b>
<b>Data unit</b>	Name of the plant; Installed capacity (MW); Fuel type; Commissioning date.
<b>Description</b>	Set of power capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently.
<b>Source of data</b>	Turkish Electricity Transmission Company (TEIAS) Generation units put into operation in 2007, 2008, 2009, 2010.
<b>Value applied</b>	Validated VCS Project Description (Version 08) of the Project, Section 2.4
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, hence providing the most up-to-date and accurate information available.
<b>Purpose of Data</b>	To calculate the Operating Margin (OM) factor
<b>Comments</b>	

<b>Data / Parameter</b>	$\eta_{m,y}$
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<b>Data unit</b>	%
<b>Description</b>	Average net energy conversion efficiency of power unit m in year y
<b>Source of data</b>	UNFCCC web site: “Tool to calculate the emission factor for an electricity system”.
<b>Value applied</b>	Validated VCS Project Description (Version 08) of the Project, Annex 7
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	N/A
<b>Purpose of Data</b>	Used for baseline emission calculation.
<b>Comments</b>	No official efficiency values based on each power plant or each fuel type is available in Turkey Most natural gas power plants in Turkey are combined cycle, most coal power plants operate sub-critical and most liquid fuel power plants adopt an open cycle technology.

<b>Data / Parameter</b>	<b>EG</b> <sub>facility,y</sub>
<b>Data unit</b>	MWh/yr
<b>Description</b>	Quantity of net electricity generation supplied by the project to the grid in year y.
<b>Source of data</b>	Project activity site. (The Monthly Meter Reading Protocols)
<b>Value applied</b>	966,530 MWh/yr
<b>Justification of choice of data or description of measurement methods and procedures applied</b>	Continuous measurement and monthly readings. Monthly meter reading protocols will not include the transmission losses..
<b>Purpose of Data</b>	-
<b>Comments</b>	-

## 4.2 Data and Parameters Monitored

<b>Data / Parameter</b>	<b>A<sub>PJ</sub></b>
<b>Data unit</b>	m <sup>2</sup>
<b>Description</b>	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
<b>Source of data</b>	Project site
<b>Description of measurement methods and procedures to be applied</b>	Measured from topographical surveys, maps, satellite pictures, etc.
<b>Frequency of monitoring/recording</b>	Yearly
<b>Value monitored</b>	14,299,000 m <sup>2</sup>
<b>Monitoring equipment</b>	Topographical surveys, maps, satellite pictures
<b>QA/QC procedures to be applied</b>	
<b>Purpose of the data</b>	Calculation of project emissions
<b>Calculation method</b>	The reservoir area is calculated by a topographical engineer based on the map showing the reservoir area at the maximum altitude. (Please see the Appendix 1)
<b>Comments</b>	Since there is no capacity increase, the same installed capacity during the registration is valid. Therefore, no annual electronic spreadsheet has been recorded for the area of the reservoir and the reservoir area corresponding to maximum operational level has been taken into consideration.

<b>Data / Parameter</b>	<b>EG<sub>facility,y</sub></b>
<b>Data unit</b>	MWh
<b>Description</b>	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y

<b>Source of data</b>	Main source is the monthly meter readings records (EPIAŞ data, also known as PMUM). Invoicing of the electricity production is carried out according to EPIAŞ data; thus, rendering the EPIAŞ data official source of electricity generation																																							
<b>Description of measurement methods and procedures to be applied</b>	The net electricity generation supplied to the grid is measured continuously by meters (both main and spare) and recorded monthly.																																							
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<b>Value monitored</b>	<table border="1"> <thead> <tr> <th>Vintage</th> <th>Electricity supplied to the grid (MWh)</th> <th>Electricity consumption from the grid (MWh)</th> <th>Net electricity supplied to the grid [MWh]</th> </tr> </thead> <tbody> <tr> <td>01/06/2012-31/12/2012</td> <td>425,886.78</td> <td>847.97</td> <td>425,038.81</td> </tr> <tr> <td>01/01/2013-31/12/2013</td> <td>708,589.77</td> <td>1,365.46</td> <td>707,224.31</td> </tr> <tr> <td>01/01/2014-31/12/2014</td> <td>497,394.11</td> <td>1,693.43</td> <td>495,700.68</td> </tr> <tr> <td>01/01/2015-31/12/2015</td> <td>1,056,283.95</td> <td>1,355.34</td> <td>1,054,928.61</td> </tr> <tr> <td>01/01/2016-31/12/2016</td> <td>653,471.33</td> <td>1,892.88</td> <td>651,578.45</td> </tr> <tr> <td>01/01/2017-31/12/2017</td> <td>702,174.42</td> <td>1,711.55</td> <td>700,462.87</td> </tr> <tr> <td>01/01/2018-28/02/2018</td> <td>283,630.58</td> <td>413.47</td> <td>283,217.11</td> </tr> <tr> <td><b>Total (01/06/2012-28/02/2018)</b></td> <td><b>4,212,595.80</b></td> <td><b>9,147.17</b></td> <td><b>4,203,448.63</b></td> </tr> </tbody> </table>				Vintage	Electricity supplied to the grid (MWh)	Electricity consumption from the grid (MWh)	Net electricity supplied to the grid [MWh]	01/06/2012-31/12/2012	425,886.78	847.97	425,038.81	01/01/2013-31/12/2013	708,589.77	1,365.46	707,224.31	01/01/2014-31/12/2014	497,394.11	1,693.43	495,700.68	01/01/2015-31/12/2015	1,056,283.95	1,355.34	1,054,928.61	01/01/2016-31/12/2016	653,471.33	1,892.88	651,578.45	01/01/2017-31/12/2017	702,174.42	1,711.55	700,462.87	01/01/2018-28/02/2018	283,630.58	413.47	283,217.11	<b>Total (01/06/2012-28/02/2018)</b>	<b>4,212,595.80</b>	<b>9,147.17</b>	<b>4,203,448.63</b>
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<b>Monitoring</b>																																								

**equipment**

Meters are in compliance with the communiqué for Metering Devices to be used in Electricity Market.

The specification of electricity meters is provided below:

Name	Serial Number	Brand Model	Date of Last Calibration	Transformer Information
Main Meter	53042206	ACTARIS-SL761A	19/12/2017	TM1
Backup meter	53042208	ACTARIS-SL761A	19/12/2017	TM1
Main Meter	53042209	ACTARIS-SL761A	19/12/2017	TM2
Backup meter	53042207	ACTARIS-SL761A	19/12/2017	TM2

Accuracy class: Active 0.2S – Reactive 2

During the monitoring period six metering tests were performed on 12/06/2012, 22/11/2013, 15/07/2014, 15/07/2015, 08/06/2016 and 19/12/2017 respectively. The calibration test results are provided to the DOE.

The main and back meters was changed in 2020. The features of the new electricity meters are provided below:

Name	Serial Number	Brand Model	Date of Last Calibration	Transformer Information
Main Meter	8923679	EMH-LZQJ-XC	19/12/2020	TM1
Backup meter	8923680	EMH-LZQJ-XC	19/12/2020	TM1
Main Meter	8923681	EMH-LZQJ-XC	19/12/2020	TM2
Backup meter	8923682	EMH-LZQJ-XC	19/12/2020	TM2

Accuracy class: Active 0.2S – Reactive 0.5S

The project's electricity production is fed into the grid through the transformer stations. (TM1 and TM2)

<b>QA/QC procedures to be applied</b>	<p>Measurements are undertaken using energy meters.</p> <ul style="list-style-type: none"> <li>• According to the Article 2 of the Communiqué of Meters in Electricity Sector<sup>14</sup>: ‘The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained “Type and System Approval” certificate from the Ministry of Trade and Industry.’ Therefore, Ministry of Trade and Industry (Ministry) is responsible from control and calibration of the meters.</li> <li>• Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems' (Regulation) of Ministry states that: ‘b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years.’ Therefore; periodic calibration of the meters will be done every 10 years.</li> <li>• As above mentioned, the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan. In addition to that the quantity of net electricity delivered to the grid will be cross checked with the meter reading records (OSF forms) provided to the company by TEIAS and internal reports provided to the head of the company by the plant manager.</li> <li>• The net electricity export/supplied to a grid is the difference between the measured quantities of the grid electricity export and the import. Main source is the monthly meter readings records (EPIAŞ data, also known as PMUM). Data from remote automatic meter reading system (OSOS) is used for crosschecking. Invoicing of the electricity production is carried out according to EPIAŞ data; thus, rendering the EPIAŞ data official source of electricity generation.</li> </ul>
<b>Purpose of the data</b>	Calculation of net electricity supplied to the grid and thus baseline emissions
<b>Calculation method</b>	The net electricity is calculated by: <ol style="list-style-type: none"> <li>a) Subtracting self-consumption value from gross generation value for each month to find the net electricity supplied to the grid.</li> </ol>

<sup>14</sup> [http://www.epdk.gov.tr/documents/elektrik/mevzuat/teblig/elektrik/sayaclar\\_hakkinda/Elk\\_Tblg\\_Sayaclar.doc](http://www.epdk.gov.tr/documents/elektrik/mevzuat/teblig/elektrik/sayaclar_hakkinda/Elk_Tblg_Sayaclar.doc)

	<p>b) Adding up all monthly net electricity values to calculate the total net electricity supplied to the grid during the monitoring period.</p> <p>c) Multiplying the total net electricity value with the CM emission factor.</p>
<b>Comments</b>	N/A

<b>Data / Parameter</b>	<b>Cap<sub>PJ</sub></b>
<b>Data unit</b>	MWe
<b>Description</b>	Installed capacity of the hydro power plant after the implementation of the project activity
<b>Source of data</b>	Project site
<b>Description of measurement methods and procedures to be applied</b>	SCADA system of the Project Activity
<b>Frequency of monitoring/recording</b>	Yearly
<b>Value monitored</b>	310.66 (2 x 155.33 MWe)
<b>Monitoring equipment</b>	The data is monitored from the electricity generation license which was granted by Energy Market Regulatory Authority. The company has not made any change on the project design up to know and therefore, there is no increase or decrease in the installed capacity of the power plant.
<b>QA/QC procedures to be applied</b>	-
<b>Purpose of the data</b>	Calculation of project emissions
<b>Calculation method</b>	-
<b>Comments</b>	

### 4.3 Monitoring Plan

The purpose of the monitoring plan is to ensure that the monitoring and calculation of emission reductions of the proposed Project within the crediting period are complete, consistent, clear and accurate. The project is operated by Sanko Enerji Sanayi Ve Ticaret. A.S. which ensures the overall site management in accordance with Turkish Laws and technology providers' guidelines.

The Project Proponent is responsible to implement the monitoring report according to the UNFCCC rules and procedures. According to the Turkish Law and Regulations, the methods of monitoring the net electricity fed to the grid and quality control and assures are explained below:

Monitoring data is collected in accordance with the agreement done between the project owner and Turkish Electricity Transmission Company (TEIAS) which provides the infrastructure for the connection to the national grid. The metering system is defined in the agreement as two groups: main meter and spare meter. The design of the metering system is checked and approved by TEIAS before commissioning of the plant. The technical specifications of the power meters should be in line with Measure and Metering Devices Regulation by Ministry of Industry and Trade. In addition, the Communiqué for Power Meters announced by Energy Market Regulations Authority (EMRA) requires all meters to be in line with either Turkish Standards Institution or International Electro technical Commissions Standards. The meters are placed at the point the electricity is fed to the grid and sealed on behalf of the both parties. This prevents any intervention and assures the accuracy and quality of the measurements. Concerning metering system accuracy, project participants have to comply with relevant national legislation According to b) paragraph of the 9th Article of the Regulation of Metering and Testing of Metering Systems "periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformer are done every 10 years. Since the meters are within TEIAS' province, TEIAS executes all the procedures for handling non-conformities. Therefore, the Project Participant does not have any internal auditing for this purpose.

Data will be stored electronically, during the crediting period and at least two years after the last issuance of credits for the wind farm project activity in the concerning crediting period. The Project Proponent is responsible for storage of data received from the measuring devices.

The main and spare meter readings are recorded monthly-remote automatic meter reading system and cross-checked whether calibration is required. The capacity of the transmission line connected is medium voltage of 154 kVA, the accuracy class for power meters have been defined in the Communiqué for Power Meters as 0.2S class. The calibration is implemented in accordance with the related standard procedures. The periodical

maintenance is under the responsibility of TEİAŞ and has been fixed as once in 10 years as mentioned above.

#### Operational and Management Structure

As described before, there are two main factors important for the calculation of emission reductions. The only relevant data that have to be monitored is only net electricity generation ( $EG_{\text{facility},y}$ ) per year. Since project emission is zero no additional monitoring is required. The generation data are subject to the strict internal quality control systems of both parties.

The monthly meter reading documents are stored by Sanko Enerji Sanayi Ve Ticaret. A.S. and TEİAŞ. The settlement notification, which is issued by TEİAŞ and includes the meter reading data, is stored on a TEİAŞ file server and accessible for Sanko Enerji Sanayi Ve Ticaret. A.S. via a secured website. The meters themselves can always be read as plausibility check for verification. The other important parameter is the emission factor. It is approved according to strict quality control parameters from an independent external party. With this, no additional structures or processes have to be implemented to insure the availability and high quality of the necessary data for monitoring.

The Project Manager is responsible for all issues related to the project and operation of the plant. On the other hand, the plant manager is responsible for daily operational processes of the plant, management of the plant personnel, and other technical and management issues for the plant. Electrical Engineers undertake the specific actions required by the monitoring plan, i.e. they measure the electricity generation, the electricity supplied to the Turkish grid by the power plant, the electricity imports and the amount of fuel consumed if fuel is consumed. Mechanical Engineers ensure that all the instruments and devices to perform the monitoring work properly. Administrative Officer act as the point of contact for all employees, providing administrative support and managing their queries. In total, thirty employees are working for the Project Activity. Roles and responsibilities have been summarized in the following chart.

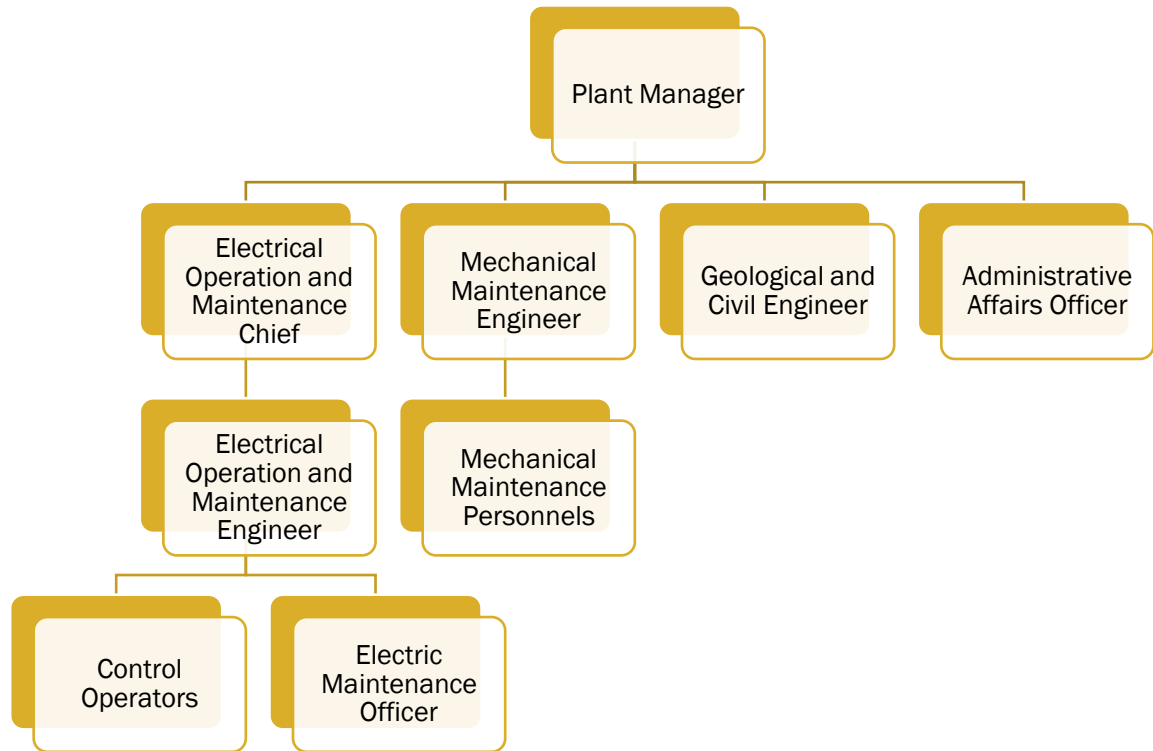


Figure 4: Operation and Management diagram

## 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

### 5.1 Baseline Emissions

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

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

$EG_{PJ,y}$  :

Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y (MWh/yr)

$EF_{grid,CM,y}$  :Combined margin CO<sub>2</sub> emission factor for grid connected power generation in year y

$EF_{grid,CM,y}$  value is fixed as 0.5429 tCO<sub>2</sub>/MWh for during the crediting period.

Calculation of  $EG_{PJ,y}$

Since the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity:

$$EG_{PJ,y} = EG_{\text{facility},y}$$

Where:

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

$EG_{\text{facility},y}$  :Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).

## 5.2 Project Emissions

There is no project emission resulting from the reservoir area of the Project Activity as the power density of the project is greater than 10W/m<sup>2</sup>.

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

$$PD = (Cap_{PJ} - Cap_{BL}) / (A_{PJ} - A_{BL})$$

Where:

PD = Power density of the project activity, in W/m<sup>2</sup>

Cap<sub>PJ</sub> = Installed capacity of the hydro power plant after the implementation of the project activity (W)

Cap<sub>BL</sub> = Installed capacity of the hydro power plant before the implementation of the project

activity (W). For new hydro power plants, this value is zero

A<sub>PJ</sub> = Area of the reservoir measured in the surface of the water, after the implementation of

the project activity, when the reservoir is full (m<sup>2</sup>)

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

$$Cap_{PJ} = 310,660,000 \text{ W}$$

$$Cap_{BL} = 0 \text{ (Justification: The project is a new hydro power plant)}$$

$$A_{PJ} = 14,299,000 \text{ m}^2$$

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

Therefore;  $PD = (310,660,000 - 0) / (14,299 - 0) = 21.73 \text{ W/m}^2$

Since the Power Density of the Project is greater than  $10 \text{ W/m}^2$   $PE_y = 0$

### 5.3 Leakage

No leakage emissions are considered. This is in line with the registered PDD and applicable methodology ACM0002 version 12.1.0. Therefore, the leakage from the Project Activity is zero.

### 5.4 Net GHG Emission Reductions and Removals

Also, according to ACM0002/Version 12.1.0. the emission reductions in year “y” should be calculated as the following formula:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

$ER_y$  = Emission reductions in year y (t CO<sub>2</sub>/yr).

$BE_y$  = Baseline emissions in year y (t CO<sub>2</sub>/yr).

$PE_y$  = Project emissions in year y (t CO<sub>2</sub>/yr).

$LE_y$  = Leakage emissions in year y (t CO<sub>2</sub>/yr).

y = Refers to a given period

Since  $PE_y$  and  $LE_y$  are assumed to be 0, emission reductions are equal to baseline emissions.

Year	Baseline emissions or removals (tCO <sub>2</sub> e)	Project emissions or removals (tCO <sub>2</sub> e)	Leakage emissions (tCO <sub>2</sub> e)	Net GHG emission reductions or removals (tCO <sub>2</sub> e)
June 2012	36,481	0	0	36,481
August 2012	25,035	0	0	25,035
September 2012	23,700	0	0	23,700
October 2012	26,135	0	0	26,135

<b>November 2012</b>	20,482	0	0	20,482
<b>December 2012</b>	29,913	0	0	29,913
<b>Total 2012 Vintage (01.06.2012-31.12.2012)</b>	<b>230,753</b>	<b>0</b>	<b>0</b>	<b>230,753</b>
<b>January 2013</b>	24,715	0	0	24,715
<b>February 2013</b>	47,273	0	0	47,273
<b>March 2013</b>	54,509	0	0	54,509
<b>April 2013</b>	55,876	0	0	55,876
<b>May 2013</b>	49,517	0	0	49,517
<b>June 2013</b>	24,794	0	0	24,794
<b>July 2013</b>	23,329	0	0	23,329
<b>August 2013</b>	26,200	0	0	26,200
<b>September 2013</b>	19,772	0	0	19,772
<b>October 2013</b>	13,070	0	0	13,070
<b>November 2013</b>	19,502	0	0	19,502
<b>December 2013</b>	25,394	0	0	25,394
<b>Total 2013 Vintage (01.01.2013-31.12.2013)</b>	<b>383,952</b>	<b>0</b>	<b>0</b>	<b>383,952</b>
<b>January 2014</b>	13,196	0	0	13,196
<b>February 2014</b>	20,571	0	0	20,571
<b>March 2014</b>	43,728	0	0	43,728
<b>April 2014</b>	35,916	0	0	35,916

<b>May 2014</b>	16,289	0	0	16,289
<b>June 2014</b>	20,556	0	0	20,556
<b>July 2014</b>	17,739	0	0	17,739
<b>August 2014</b>	19,114	0	0	19,114
<b>September 2014</b>	19,586	0	0	19,586
<b>October 2014</b>	16,130	0	0	16,130
<b>November 2014</b>	14,999	0	0	14,999
<b>December 2014</b>	31,291	0	0	31,291
<b>Total 2014 Vintage (01.01.2014-31.12.2014)</b>	<b>269,115</b>	<b>0</b>	<b>0</b>	<b>269,115</b>
<b>January 2015</b>	61,764	0	0	61,764
<b>February 2015</b>	60,406	0	0	60,406
<b>March 2015</b>	95,600	0	0	95,600
<b>April 2015</b>	105,412	0	0	105,412
<b>May 2015</b>	64,986	0	0	64,986
<b>June 2015</b>	37,836	0	0	37,836
<b>July 2015</b>	37,678	0	0	37,678
<b>August 2015</b>	22,028	0	0	22,028
<b>September 2015</b>	23,493	0	0	23,493
<b>October 2015</b>	19,368	0	0	19,368
<b>November 2015</b>	21,216	0	0	21,216

December 2015	22,933	0	0	22,933
<b>Total 2015 Vintage (01.01.2015-31.12.2015)</b>	<b>572,720</b>	<b>0</b>	<b>0</b>	<b>572,720</b>
January 2016	32,700	0	0	32,700
February 2016	46,587	0	0	46,587
March 2016	53,179	0	0	53,179
April 2016	43,353	0	0	43,353
May 2016	47,040	0	0	47,040
June 2016	25,526	0	0	25,526
July 2016	24,762	0	0	24,762
August 2016	13,703	0	0	13,703
September 2016	19,594	0	0	19,594
October 2016	14,495	0	0	14,495
November 2016	16,950	0	0	16,950
December 2016	15,852	0	0	15,852
<b>Total 2016 Vintage (01.01.2016-31.12.2016)</b>	<b>353,741</b>	<b>0</b>	<b>0</b>	<b>353,741</b>
January 2017	43,567	0	0	43,567
February 2017	23,077	0	0	23,077
March 2017	66,538	0	0	66,538
April 2017	64,119	0	0	64,119
May 2017	45,835	0	0	45,835

<b>June 2017</b>	32,391	0	0	32,391
<b>July 2017</b>	17,801	0	0	17,801
<b>August 2017</b>	15,040	0	0	15,040
<b>September 2017</b>	13,775	0	0	13,775
<b>October 2017</b>	18,554	0	0	18,554
<b>November 2017</b>	17,252	0	0	17,252
<b>December 2017</b>	22,330	0	0	22,330
<b>Total 2017 Vintage (01.01.2017-31.12.2017)</b>	<b>380,281</b>	<b>0</b>	<b>0</b>	<b>380,281</b>
<b>January 2018</b>	51,063	0	0	51,063
<b>February 2018</b>	40,423	0	0	40,423
<b>Total 2018 Vintage (01.01.2018-28.02.2018)</b>	<b>91,486</b>	<b>0</b>	<b>0</b>	<b>91,486</b>
<b>Total Sum (01.06.2012- 28.02.2018)</b>	<b>2,282,048</b>	<b>0</b>	<b>0</b>	<b>2,282,048</b>

Table 4: Summary of Emission Reductions

# APPENDIX 1: RESERVOIR AREA MAP

