

VCS VERIFICATION REPORT FOR AYDIN SALAVATLI DORA-1 GEOTHERMAL POWER PLANT



Document Prepared By China Classification Society Certification Company

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Summary:

China Classification Society Certification Company (CCSC), commissioned by South Pole Carbon Asset Management Ltd., has performed the fifth periodic verification of the Aydın Salavatlı Dora-1 Geothermal Power Plant (hereafter referred to as “the Project”) covering the monitoring period from 01/01/2015 to 31/10/2017, on the basis of requirements of Verified Carbon Standard (VCS) Version 3.7.

The Project involves the installation and operation of a 7.951MW Geothermal Power Plant, which is located in the west of the village Salavatlı, near the city of Aydın in Turkey. The Project is expected to export annual electricity of 51,284 MWh to the Turkish electricity grid respectively utilizing renewable hydro resources and the estimated emission reductions is 30,309tCO₂ per annum. The project activity achieves greenhouse gas (GHG) emissions reductions by displacing electricity from existing fossil fuel based power plants and likely capacity additions within the given grid.

The Project has been registered as a VCS project (VCS Registration No. 120) under VCS 2007 using approved CDM methodology AMS-I.D- “Grid connected renewable electricity generation” (Version 13.0) with the first renewable crediting period from 01/07/2008 to 30/06/2018.

The verification process includes three phases:

- 1) Desk review of documents;
- 2) On-site visit and follow-up interviews;
- 3) Issuance of the final verification report and opinion.

CCSC appointed a qualified verification team in accordance with internal procedures to perform the verification.

In the course of the verification, One Corrective Action Request (CAR) was raised and has been

closed.

As a result of this verification, the verification team confirms that:

- All operations of the Project are implemented and installed as planned and described in the validated Project Description;
- The registered monitoring plan is in accordance with the applied approved CDM methodology, i.e., AMS-I.D- *“Grid connected renewable electricity generation”* (Version 13.0).
- The implementation of monitoring is in compliance with the registered monitoring plan.
- The monitoring system is in place and functional;
- The installed equipment for measuring parameters required for calculating emission reductions are calibrated appropriately.

Based on the information observed and evaluated, the verification team confirms that the emission reductions are correctly calculated in the MR (Version 2.0 dated 21/08/2018).

In conclusion, it is CCSC’s opinion that the project activity “Aydin Salavatli Dora-1 Geothermal Power Plant”, as described in the Monitoring Report (Version 2.0), meets all relevant requirements for VCS and all relevant host Party criteria. Hence, CCSC is able to certify that the emission reductions from the Project during the monitoring period from 01/01/2015 to 31/10/2017 amount to 60,289 tCO₂e, and requests issuance of the equivalent VCUs.

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1 INTRODUCTION

1.1 Objective

South Pole Carbon Asset Management Ltd. has commissioned CCSC to verify and provide a verification statement of the emission reductions of the Aydın Salavatlı Dora-1 Geothermal Power Plant (hereafter referred to as “the Project”) which is located in west of the village Salavatlı, near the city of Aydın in Turkey, for the fifth monitoring period from 01/01/2015 to 31/10/2017.

CCSC as the validation/verification body (VVB) of the Project has been accredited as a DOE by UNFCCC and also meets the competence requirements as set out in ISO 14065:2013 /10/.

Verification of emission reductions from a project activity is the independent review and ex post determination by VVB of the monitored reductions in GHG emissions during the reported monitoring period. The objectives of verification are to:

- a) Ensure that the project activity has been implemented and operated as per the VCS project description (VCS-PD) /3/ and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- b) Ensure that the monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of Registration and Issuance Process /9/ and in accordance with the additional requirements stated by the VCS Association (VCSA);
- c) Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology /6/;
- d) Evaluate the data recorded and stored as per the monitoring methodology /6/.

1.2 Scope and Criteria

The verification scope encompasses an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the CCSC. The verification scope covers the relevant documents (e.g. the VCS-PD /3/, the monitoring plan, the VCS monitoring report (VCS-MR) /1/, the emission reduction calculation spreadsheet /2/, supporting documents available to the verifier and information collected through performing interviews and during the on-site assessment, VCAS’s requirements publicly available, relevant rules, including the host country legislation, etc.) to be independently reviewed, the Project geographical locations to be visited on-site, the related project local stakeholders to be interviewed with, and processes that are necessary to acquire objective evidence for the evaluation of the Project compliance to the VCS requirements and associated interpretations.

The above verification activities are conducted according to the VCS requirements. In doing so, the principles of accuracy and completeness, relevance, reliability and credibility were followed.

The verification is not meant to provide any consulting service towards the PPs. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the project.

1.3 Level of Assurance

CCSC has undertaken a reasonable assurance engagement in accordance with VCS Standard /5/. It requires a reasonable level of assurance in verification that GHG assertions are free of material errors, omissions and misrepresentations. The verification conclusion is based on the VCS-PD /3/, VCS-MR /1/, and supporting evidences made available to the verifier and information collected through performing interviews and during the on-site inspection.

1.4 Summary Description of the Project

The Aydin Salavatli Dora-1 Geothermal Power Plant involves the installation and operation of a 7.951MW Geothermal Power Plant, which is located in the west of the village Salavatli, near the city of Aydin in Turkey. The Project is expected to export annual electricity of 51,284 MWh to the Turkish electricity grid respectively utilizing renewable hydro resources and the estimated emission reductions is 30,309tCO₂ per annum. The project activity achieves greenhouse gas (GHG) emissions reductions by displacing electricity from existing fossil fuel based power plants and likely capacity additions within the given grid.

The Project has been registered as a VCS project (VCS Registration No. 120) under VCS 2007 using approved CDM methodology AMS-I.D- “Grid connected renewable electricity generation” (Version 13.0) with the first renewable crediting period from 01/07/2008 to 30/06/2018.

According to the VCS website, the Project has been registered as a VCS project (VCS Registration No. 120) and the current fifth verification has been finalized for the monitoring period from 01/01/2015 to 31/10/2017.

During the monitoring period from 01/01/2015 to 31/10/2017, *the total GHG emission reductions generated by the Project are 60,289 tCO₂e.*

2 VERIFICATION PROCESS

2.1 Method and Criteria

The overall verification, from Contract Review to Verification Report & Opinion, was conducted using CCSC internal procedures.

CCSC verified the Project against the requirements set in VCS /5//7//8//9/, and other relevant VCS requirements.

The following sections outline each step in more detail.

2.2 Document Review

A desk review of the VCS-PD /3/, the validation report /4/, the previous verification reports /13/, the registered VCS-PD /13/ and the registered validation report/13/, the applied monitoring methodology /6/, the VCS monitoring report (VCS-MR) /1/ and supporting documents was conducted by the verification team. The aim of the desk review of the documentation was to verify the completeness of the data and the information presented, to carry out the compliance check of the VCS-MR /1/ with respect to the monitoring plan and the applied methodology /6/. Particular attention was given to the sampling approach, the quality of the metering equipment including calibration requirements, the monitored data and its evidence, and the emission reduction calculation. The evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions was also conducted.

Appendix A of this report contains a complete list of all documents and proofs reviewed by the verification team.

2.3 Interviews

On 07/09/2018 to 08/09/2018 CCSC performed an on-site assessment at the physical site of sampled individual projects of the Project.

The verification team verified that the actual implementation of the Project was as described in the VCS-PD /3/ and VCS-MR /1/. This included the review of the project operation based on the evidence of on-site observation and presented documents.

During the on-site assessment, the verification team has interviewed with key personnel from the Project owner (the project participant) and the consultancy.

The assessment content and topics/the persons interviewed at the on-site assessment were provided in the below table.

Date: 07/09/2018-08/09/2018	
Interview topics	Interviewed Organizations and persons
--The status of VCS project implementation. -- Any changes of the VCS project. -- The project on-site inspection —The evidences of construction status and operation of key equipment, parameters monitoring and data processing activities, monitor equipment and calibration. -- Monitoring data. --Quality Management; organizational structure, responsibilities and competencies; Internal QA/QC Management procedures and document control.	Menderes Geothermal Elektrik Uretim A.S. Mr. Haluk Tufekcioglu (Board Manager) Mr. Erol Tafelecioglu (Assistant) Mr. Kamal Aygun (Technical Engineer)

-- Preparation of Monitoring Report. -- Compliance of the monitoring plan with the monitoring methodology -- Compliance of monitoring with the monitoring plan -- Assessment of data and calculation of GHG emission reductions	South Pole Carbon Asset Management Ltd. Mr. Yang Xuan, Region Director
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2.4 Site Inspections

The on-site assessment involved following activities,

- 1) An assessment of the implementation and operation of the project activity as per the VCS-PD /3/;
- 2) A review of information flows for generating, aggregating and reporting the monitoring parameters;
- 3) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the approved monitoring plan;
- 4) A cross-check between information provided in the monitoring report /1/ and data from other sources such as operational records or similar data sources;
- 5) A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the VCS-PD /3/ and the selected methodology /6/;
- 6) A review of calculations and assumptions made in determining the GHG data and emission reductions;
- 7) An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

2.5 Resolution of Findings

During the verification of a project activity, to identify issues that need to be further elaborated upon, researched or added to in order to confirm that the project activity meets the VCS requirements and can achieve credible emission reductions, the verification team will issue a Corrective Action Request (CAR), a Clarification Request (CL) or a Forward Action Request (FAR) depending on different situations.

The objective of this phase of the verification is to resolve issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions prior to CCSC's positive conclusion on the GHG emission reduction calculation.

Findings established during the verification can either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

A Corrective Action Request (CAR) will be raised if one of the following occurs:

- (a) Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- (b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- (c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- (d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

A Clarification Request (CL) will be raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

A Forward Action Request (FAR) will be raised, for actions if the monitoring and reporting require attention and/or adjustment for the next verification period.

There is one CAR that has been raised during the current 5th verification.

2.5.1 Forward Action Requests

No Forward Action Requests were remianed during the previous verifications and validation, and no FAR is raised during this 5th verification.

2.6 Eligibility for Verification Activities

The VVB of “China Classification Society Certification Company” commissioned by the project participant is one of eligible VVBs listed on the VCS website (<http://www.v-c-s.org/china-classification-society-certification-company>), and it holds the accreditation for validation/verification for the sectoral scope: “1. Energy (renewable/non-renewable)”, to which the project activity belongs. Therefore, CCSC is eligible for the validation/verification of the project activity.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The verification team has checked the official website of other GHG Programs like CDM, GS VER, and is able to confirm that the Project is not included in any GHG programs or any other mechanisms that include GHG allowance trading. The net GHG emission reductions generated by the Project during this monitoring period have not been used for compliance under any emission trading programs or mechanisms. The Project have not sought or received any other form of GHG-related environmental credit during this monitoring period.

The Project has been registered as a VCS project, and it did not apply for any other approved or not approved GHG programs.

Therefore, the Verification Team confirms that the project is eligible to participate under the VCS Program.

3.2 Methodology Deviations

No deviation from the methodology is needed to be submitted.

3.3 Project Description Deviations

Through on-site interviews and document review, the verification team confirms that there are no project description deviations according to the Registered PD /3/.

3.4 Grouped Project

The Project is not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

4.1.1 Project Implementation in accordance with the VCS PD

The Aydin Salavatli Dora-1 Geothermal Power Plant involves the installation and operation of a 7.951MW Geothermal Power Plant, which is located in the west of the village Salavatlı, near the city of Aydin in Turkey. The Project is expected to export annual electricity of 51,284 MWh to the Turkish electricity grid respectively utilizing renewable hydro resources. The project activity achieves greenhouse gas (GHG) emissions reductions by displacing electricity from existing fossil fuel based power plants and likely capacity additions within the given grid.

The Aydin Sultanhisar-Salavatli geothermal field is a liquid dominated reservoir. Electricity is generated from geothermal energy at a temperature ranging from 78°C to 170°C. The installed technology is the Ormat Energy Converter (OEC). The employed Organic Rankine Cycle & Binary technology is designed for the specific conditions of a wide variety of heat sources and therefore provides increased efficiency for the geothermal power plant. It is an outdoor installation that

consists of a vaporizer/pre-heater, turbo generator, aircooled condenser, feed pump and controls. The Generator has an installed capacity of 7.951 MW and is fed by two production wells, AS-1 and ASR-2. While AS-1 is connected to the electricity generation facility through 900-meter-long isolated tubes, the distance for the connection between ASR-2 and the generation facility is 100 meters. The hot brine is pumped from the production wells and directed to the generator through isolated transmission lines. The thermal fluid is passed through a heat exchanger, and the heat from the fluid is transferred to a secondary fluid, a hydrocarbon (pentane). The pentane is vaporized to generate electricity via two turbines (with 4MW of nameplate capacity each), which are both connected to a power generator. After having passed the heat exchanger, the geothermal fluid drops to 78°C and is re-injected back to the reservoir via a re-injection well. The re-injection well named AS-2 is located right at the generation facility.

The production cycle is closed due to complete re-injection of the geothermal brine into the reservoir. This system serves both to sustain the reservoir and avoids adverse environmental impacts. The inhibitor and the dosing pump installed at the re-injection well prevent the fluid from causing corrosion and silica sediment deposits.

The secondary fluid is used in a closed cycle as well. After passing the generator the fluid is cooled down at the ventilation area and again directed to the heat exchanger. The applied technology is state-of-the-art and the project is therefore first of its kind in Turkey. The project reflects good practice.

It was confirmed by site inspection of the project is located in the west of the village Salavatlı, near the city of Aydın in Turkey. The power generating technology, installed capacity, technical specifications of the production wells, thermal fluid, production cycle and electricity delivering systems have been verified to be consistent with the VCS-PD /3/ by site assessment.

The first crediting period is 10 years, from 1st July 2008 to 30th June 2018. This monitoring report covers the period from 01/01/2015 to 31/10/2017.

Besides generating renewable energy electric power, the proposed Project will contribute positive effects for the local sustainable development through the following aspects:

- 1) By utilizing geothermal resources for energy generation, the project activity improves the scale and security of energy supply in the country, and alleviates the fossil fuel consumption;
- 2) By exporting the project's electricity to the grid system, the grid's electricity capacity is increased which enables increased access to clean energy in the region and ensures a wider scope of the national grid in providing electricity to more consumers.

Through document review, the verification team has verified that the project commissioning start date has been appropriately described in the monitoring report /1/ in accordance with the VCS-PD /3/.

Therefore, the verification team confirms that no data and/or variables presented in the monitoring report /1/ and the associated emission reduction calculations /2/ differ significantly from the ones stated in the VCS-PD /3/, which may lead to an increase in the emission reductions for this period in relation to the estimates in the VCS-PD /3/.

According to the information collected during on-site visit and the relevant evidence provided by project owner, CCSC can confirm that no project design change occurred during the monitoring period and the Project was implemented in accordance the VCS-PD /3/.

4.1.2 Compliance of monitoring with the monitoring plan

The verification team has assessed the implementation of monitoring by the project owner against the registered monitoring plan. A short summary on the verification of every parameter listed in the monitoring plan and used for emission reduction calculation is provided below:

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in the monitoring plan of PD):	EG_y Net electricity exported to the grid in the year y
Measuring frequency:	Continuously measurement
Reporting frequency:	Monthly recorded
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Monitored by a power meter and recorded monthly by monitoring employees of TEDAS/ AYDEM by means of online meter readings
Is accuracy of the monitoring equipment as stated in the PD? If the PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	No accuracy of the monitoring equipment as stated in the PD. Accuracy level of monitoring meters is 0.5S, which is considered as good monitoring practice.
Calibration frequency /interval:	Periodically as per relevant sectoral standards in Turkey
Is the calibration interval in line with the monitoring plan of the PD? If the PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes.
Company performing the calibration:	See Table 4-1
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes.
Is(are) calibration(s) valid for the whole reporting period?	Yes. For details see Table 4-1.
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data has been cross-checked with the electricity transaction receipts in line with the VCS-PD /3/.
How were the values in the monitoring report verified?	The verification details have been reported in Section 4.2 of this report.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring	Not applicable.

plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	
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Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in the monitoring plan of PD):	PE_{Dcons} Diesel consumed from running the diesel generator
Measuring frequency:	Continuously measurement
Reporting frequency:	Monthly recorded
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Type of monitoring equipment:	Monitored by the system of diesel generator
Is accuracy of the monitoring equipment as stated in the PD? If the PD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	No accuracy of the monitoring equipment as stated in the PD.
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan of the PD? If the PD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA
Company performing the calibration:	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	NA
How were the values in the monitoring report verified?	The verification details have been reported in Section 4.2 of this report.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable.

Furthermore, the verification team has verified that the accuracy of measure of the monitoring equipment was set according to the requirements and all calibration procedures were carried out

according to the monitoring plan and manufacturer specifications. The calibration information has been listed in Table 4-1 below. The monitoring equipment has been installed in the project activity according to registered monitoring plan. In summary, the verification team is able to verify that the accuracy the monitoring equipments were set according to the registered monitoring plan and relevant sectoral standard of Turkey.

Table 4-1 Verified calibration information of monitoring meters

Meter Serial No.	Meter Model Number	Accuracy Class	Calibration Entity	Calibration Date	Calibration Valid Until
424848	Elster A1500	0.5S	Elster Endress+Hauser	22/09/2010	21/09/2020 ¹

4.1.3 Remaining Issues from Previous Validation or Verification

This is the 5th verification and the verification team can confirm that there were no any remaining issues from the validation report and previous verification reports /13/.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

4.2.1 Parameters and information flow

The parameters required by the monitoring plan and the way CCSC has verified the information flow (from data generation, aggregation, to recording, calculation and reporting for these parameters including the values) in the monitoring report are described below:

Parameters monitored ex-post:

- 1) **EG_y**: Net electricity exported to the grid in the year y;
- 2) **PE_{Dcons}**: Diesel consumed from running the diesel generator.

According to the VCS-MR /1/ of the Project and the VCS-PD /3/, the net electricity is the difference of the electricity export and the electricity import. Diesel consumed from running the diesel generator is calculated based on the operation hour, fuel consumption rate and density of diesel.

The verification team has cross-checked the input values in the emission reductions calculation spreadsheet /2/ with the electricity transaction receipts. It was confirmed the electricity transaction receipts can identify the electricity export to the grid.

Parameter determined ex-ante:

EF_{grid,CM,y}: The Combined margin CO2 emission factor for grid connected power generation in year y. According to the Tool to calculate the emission factor for an electricity system (version 02), the Combined margin CO2 emission factor is calculated as:

¹ As per the Article. 9 of Measure and Metering Devices Regulation, the official period of validity for the calibration of electronic electricity meter as used in this project is defined as 10 years. No requirement was given to the electricity meter in the VCS-PD.

$$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y}$$

According to the Registered PD /3/, the $EF_{grid,CM,y}$ is ex-ante determined as 0.591 tCO₂e/MWh for this crediting period. The emission factors used in the monitoring report have been verified against the VCS-PD /3/ and found to be consistent.

4.2.2 Assessment Data and Calculation

According to the baseline methodology AMS-I.D., the emission reduction E_R by the project activity during a given year y is defined as:

$$ER_y = BE_y - PE_y - LE_y$$

Since the leakage emission has been justified as zero under AMS-I.D Version 13.0 /6/, the calculation of the emission reductions simply involves the calculation of the baseline emissions and project emission.

Where BE_y is calculated as

$$BE_y = (EG_y - EG_{baseline}) * EF_{grid,CM,y}$$

Where: the $EG_{baseline}$ is considered as 0 as the project does not involve modified or retrofit facilities.

Project emissions from fossil fuel consumption are calculated as per Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, version 02 as follows:

$$PE_{FF,y} = \sum_i FC_{FF,i,y} \times COEF_{FF,i,y}$$

Where

- PE_{FF,j,y} Are the CO₂ emissions from fossil fuel combustion during the year y (tCO₂/yr)
- FC_{FF,i,y} Is the quantity of fuel type i combusted during the year y (mass or volume unit/yr)
- COEF_{FF,i,y} Is the CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)
- i Are the fuel types combusted during the year y

The CO₂ emission coefficient $COEF_{FF,i,y}$ can be calculated as follows:

$$COEF_{FF,i,y} = NCV_{i,y} \times EF_{CO_2,i,y}$$

Where,

- COEF_{FF,i,y} Is the CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)

- $NCV_{i,y}$ Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit) 43TJ/Gg from 2006 IPCC Guidelines is adopted in this monitoring period.
- $EF_{CO_2,i,y}$ Is the weighted average CO_2 emission factor of fuel type i in year y (t CO_2 /GJ) 74100kg/TJ from 2006 IPCC Guidelines is adopted in this monitoring period.
- i Are the fuel types combusted during the year y

Following the approach described in section 4.2.1 above, EG_y and BE_y was verified as below:

Vintage	EG_y (MWh)	$EF_{grid,CM,y}$ (t CO_2 /MWh)	BE_y (t CO_2)
01/01/2015-31/12/2015	45,485.382	0.591	26,881
01/01/2016-31/12/2016	41,589.122		24,579
01/01/2017-31/10/2017	14,939.796		8,829
Total	102,014.299		60,289

The project emissions is calculated as:

Parameter	Unit	Value
Initial Operating hours	hrs	517.68
Final Operating hours	hrs	642.22
Operating hours	hrs	124.54
Fuel Consumption Rate	lt/hr	20.61
Fuel Consumption	lt	2567
Density of Diesel	kg/lt	0.83
Diesel Consumption	kg	2128
Diesel Consumption	tonnes	2.128
NCV of Diesel	TJ/Gg	43
Carbon Emission factor of Diesel	kg/TJ	74100
Emission Factor for Diesel	t CO_2 / ton	3.186
GHG Emissions from Diesel	t CO_2	7

As the project emission is much less than 1% of baseline emissions, according to the description in registered PDD, the project emission can be neglected. So $PE_y=0$

By cross-check with the electricity transaction receipts, the verification team confirms that the monitoring results as listed in the Monitoring Report /1/ and emission reductions calculation spread sheet /2/ are conservative. The verification team confirms that the applied spreadsheet formulas and connections are correct and in line with the indicated emission reduction calculation in the monitoring plan contained in the VCS-PD /3/ and the applied methodology /6/.

The **CAR-1** was rasied here;

The baseline emission of 2017 was wrongly calculated. In the GHG ER calculations spreadsheet and MR, “Net Electricity Exported to the Grid” in the column I should be calculated as “Electricity Exported- Electricity Imported”, however, this calculation formula was wrong which result in the wrong baseline emission. Please correct.

The CCSC verification team have checked the revised MR and ER calculation sheet, the calculation formula of Net Electricity Exported to the Grid and it related results have been corrected. The CAR-1 is therefore closed.

Comparison of ERs

Based on the above assessment, CCSC can conclude that the emission reduction during the monitoring period from 01/01/2015 to 31/10/2017 have been quantified correctly in accordance with the project description and applied methodology /6/, and the emission reduction during the monitoring period is verified as 60,289 tCO₂e. Compared with the estimated emission reductions under the same days of 1035 from 01/01/2015 to 31/10/2017 in the VCS-PD /3/, 85,945(=30,309*1035/365) tCO₂e, the verified emission reduction is (29.85%) less than the estimated value.

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

The evidences used to determine the GHG emission reductions are assessed as follows:

Assessment of the Evidence Quality	
Parameters monitored ²	EG _y
Monitoring method	The quantity of net electricity supplied to the gird is measured by bi-direction electricity meters. Diesel consumed from running the diesel generator is calculated based on the operation hour, fuel consumption rate and density of diesel.
Measuring/Reading/Recording frequency	The parameters are continuously measured and monthly recorded.
Calibration frequency/ interval	See Table 4-1 Verified calibration information of monitoring meter. Through on-site observation and checking the calibration record of electricity meter, the team confirmed that all the monitoring meter meets the accuracy level and the calibration frequency fulfils the requirement by lcoal government.
Calibration cover the monitoring period	The verification team confirms that the validity period of calibration covers this monitoring period from 01/01/2015 to 31/10/2017.
Data reported	Through cross checking with the electricity transaction receipts, the monitored data can be confirmed as acceptable to calculate emission reductions.

In summary, all necessary documentation is collected, referenced and is easily accessible in hard-copy or electronic format. The data pertaining to the monitored parameters are maintained in

² The projet emissions due to fuel consumption is very small, and considered inmaterial for quality assessment.

the identified internal records and consistent with the values stated in the Monitoring Report /1/ and ER calculation spreadsheet /2/. Key data have been cross-checked via external sources, such as electricity transaction receipts.

4.4 Non-Permanence Risk Analysis

During the verification site visit it could be verified that the operational structure is in line with the VCS PD and the management procedures are in place. An operational structure was established with responsibilities identified. A monitoring mechanism was found to be established by MENDERES Geothermal Elektrik Üretim A.Ş., in place and working appropriately. The verification team confirms that the authorities and responsibilities for monitoring and reporting of all data related to the emission reductions were clearly defined for the monitoring period. Moreover, all project related equipment was checked to be operated by qualified and trained staff.

The monitoring data and records were archived in electronic documents and paper documents. The project owners keep the copies of electricity generation records and sales receipts. Calibration of Meters & Metering has been implemented periodically according to relevant sector standards in Turkey. After calibrated by qualified entity, the electricity metering equipment is sealed and stamped, which has been verified during on-site assessment. It was also confirmed during site assessment that all the staff involved has received periodic trainings on operation and maintenance of the geothermal power plant.

In summary, the verification team has ensured that the quality management system for the Project is in place. The documented instructions including the responsibilities have been properly implemented and in line with the monitoring report and registered VCS PD/3/.

5 SAFEGUARDS

5.1 No Net Harm

The project utilizes Binary cycle system to generate electricity with geothermal. It is environmentally friendly and there is no harm to the environment. Therefore, it is scarcely any net harm.

5.2 Local Stakeholder Consultation

Since this is the fifth verification of the project activity, hence, local stakeholders' consultation details are not applicable in this project activity by the project proponents.

6 VERIFICATION CONCLUSION

CCSC has carried out the fifth periodic verification of the project "Aydin Salavatli Dora-1 Geothermal Power Plant". The verification was performed based on the requirements set by Voluntary Carbon Standard (VCS) Version 3.7 /5/, as well as criteria given to provide for consistent project operations, monitoring and reporting. This verification covers the period from 01/01/2015 to 31/10/2017 inclusive.

In the course of the verification one Corrective Action Request (CAR) was raised and been closed. The verification is based on the VCS-MR /1/, the VCS-PD /3/, ER calculation spread sheet /2/ and supporting documents available to CCSC.

As the result of the verification, CCSC confirms that:

- The project activity has been implemented and operated as per the VCS-PD /3/ and that all physical features (technology, project equipment, and monitoring and metering equipment) of the Project are in place;
- The VCS-MR /1/ and other supporting documents provided are complete in accordance with the latest applicable version of the VCS Registration & Issuance Process /9/ and in accordance with the additional requirements stated by the VCS Association (VCSA);
- The actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology i.e. AMS-I.D. Version 13.0 /6/;
- The GHG emission reductions are calculated without material misstatements and in a conservative and appropriate manner.

Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, CCSC confirms the following statement:

Verification period: From 01/01/2015 to 31/10/2017.

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/01/2015 to 31/10/2017	60,289	0	0	60,289

7 APPENDIX A: REFERENCE

Documents provided by the Project Participant and relevant background documents have been reviewed or referenced for the periodic verification conclusions.

Ref no.	Reference Document
/1/	South Pole Carbon Asset Management Ltd. , VCS Monitoring report Version 1.0 dated 19/03/2018
/2/	South Pole Carbon Asset Management Ltd. , ER calculation spreadsheet
/3/	South Pole Carbon Asset Management Ltd., VCS-PD dated 14/05/2008
/4/	TÜV Rheinland Japan Ltd., Validation Report dated 15/01/2009
/5/	VCS Association, Voluntary Carbon Standard Version 3.7
/6/	CDM Executive Board, AMS-I.D. Grid connected renewable electricity generation Version 13.0
/7/	VCS Association, Monitoring Report Template Form Version 3.4
/8/	VCS Board, VCS Program Guide Version 3.7
/9/	VCS Association, Registration & Issuance Process Version 3.8
/10/	International Organization for Standardization, ISO 14064-2:2006, ISO 14064-3:2006 and ISO 14065:2013 (ISO, www.iso.org).
/11/	CDM Executive Board, Tool to calculate the emission factor for an electricity system, Version 01
/12/	IPCC: Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories Reference Manual
/13/	the previous verification reports, the registered VCS-PD and the registered validation report
/14/	Elektrik Dagitim, electricity sale receipts
/15/	Training materials and training records
/16/	Fuel consumption records covering the monitoring period

/17/	Electricity line diagram
/18/	Electricity production license
/19/	Calibration reports of the electricity meter

8 APPENDIX B: RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

Draft report clarifications and corrective action requests by verification team	Summary of project participant response	Verification team conclusion
CAR-1: The baseline emission of 2017 was wrongly calculated. In the GHG ER calculations spreadsheet and MR, “Net Electricity Exported to the Grid” in the column I should be calculated as “Electricity Exported-Eelectricity Imported”, however, this calculation formula was wrong which result in the wrong baseline emission. Please correct.	The calculation formula of Net Electricity Exported to the Grid is corrected, and the baseline emissions of 2017 is corrected as well. The revised ER calculation sheet and MR have provided to the DOE.	The CCSC verification team have checked the revised MR and ER calculation sheet, the calculation formula of Net Electricity Exported to the Grid and it related results have been corrected. The CAR-1 is therefore closed.

No CLs and FARs were raised in this verification.

9 APPENDIX C: CERTIFICATES OF COMPETENCE



Appendix 9

CERTIFICATE OF COMPETENCE

Date of issue: 16/10/2017

Mr. Li Xingtong

Has been qualified in accordance with *CDM Personnel Competence Requirements and Professional Competence Evaluation Instructions* (CDMI0301) as

- CDM validator for Technical Area(s): TA1.1/TA1.2/TA3.1/TA9.2/TA13.1
- CDM verifier for Technical Area(s): TA1.1/TA1.2/TA3.1/TA9.2/TA13.1
- ☐ Technical expert for Technical Area(s): _____

Huang ShiYuan
CCSC General Manager



Appendix 9

CERTIFICATE OF COMPETENCE

Date of issue: 16/10/2017

Mr. Yong Hanlin

Has been qualified in accordance with *CDM Personnel Competence Requirements and Professional Competence Evaluation Instructions* (CDMI0301) as

- CDM validator for Technical Area(s): TA1.1/TA1.2/TA8.1/TA10.1
- CDM verifier for Technical Area(s): TA1.1/TA1.2/TA8.1/TA10.1
- ☐ Technical expert for Technical Area(s): _____

Huang ShiYuan
CCSC General Manager



Appendix 9

CERTIFICATE OF COMPETENCE

Date of issue: 16/10/2017

Ms. Zheng Ling

Has been qualified in accordance with *CDM Personnel Competence Requirements and Professional Competence Evaluation Instructions* (CDMI0301) as

- CDM validator for Technical Area(s): TA1.2
- CDM verifier for Technical Area(s): TA1.2
- Technical expert for Technical Area(s): TA13.1

Huang ShiYuan
CCSC General Manager