



VCS VERIFICATION REPORT
THE HYUNDAI WASTE ENERGY CO-
GENERATION PROJECT PHASE II
(VCS PROJECT ID: 1146)



Document Prepared By

Shenzhen CTI International Certification Co., Ltd

Project Title	The Hyundai Waste Energy Co-generation Project Phase II
Version	01
Report ID	CTI/NB-2021-1009-2

Report Title	Verification Report for The Hyundai Waste Energy Co-generation Project Phase II
Client	CERPD Inc.

Pages	51
Date of Issue	20/08/2022
Prepared By	Shenzhen CTI International Certification Co., Ltd
Contact	Address: F8-A CTI Building, No.4 LiuXianSan Road, Xin'an Street, Bao'an District, 518101, Shen Zhen, China Tel: +86 10 65580012 Email: linshunrong@cti-cert.com Website: http://www.cti-cert.org
Approved By	Zhou Lu 
Work Carried Out By	Team Leader: Lin Shunrong Technical Reviewer: Lin Wu

Summary:

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions reported for the project activity "The Hyundai Waste Energy Co-generation Project Phase II " (VCS Project ID:1146) for the 2nd monitoring period 01/07/2017-31/12/2019 within the VCS crediting period 17/05/2013-16/05/2023, to review and determine the monitored reductions in GHG emissions that have occurred as a result of the project activity. These emission reductions are claimed as Verified Carbon Units (VCU) under the VCS Standard Version 4.3.

The verification was performed on the basis of VCS Standard Version 4.3 for the VCS projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. The verification was conducted by means of document review, follow-up interviews and remote inspections, and the resolution of outstanding issues. The verification team identified five CLs, two CARs, and no FAR in this monitoring period.

In CTI's opinion, the GHG emission reductions reported for the project in the monitoring report (version 02 dated 05/08/2022) are fairly stated. The GHG emission reductions of the monitoring period from 01/07/2017-31/12/2019 were calculated correctly on the basis of approved methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" (version 4.0.0) and the monitoring plan contained in the registered VCS PD (version 3.6 dated 26/11/2014).

CTI does not assume any responsibility towards the issuance and utilization of the VCUs hereby verified and certified. Request for issuance of VCUs shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines

clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to CTI and the engagement conditions detailed in this report. CTI cannot be held liable by any party for decisions made or not made based on this report.

Hence, CTI is able to certify that the emission reductions from the “The Hyundai Waste Energy Co-generation Project Phase II ” during the period amount to 3,892,640 tCO₂e.

CONTENTS

1	Introduction	6
1.1.	Objective	6
1.2.	Scope and Criteria	6
1.3.	Level of Assurance	6
1.4.	Summary Description of the Project	8
2.	Verification Process	9
2.1.	Method and Criteria	9
2.2.	Document Review	10
2.3.	Interviews	10
2.4.	Site Inspections	11
2.5.	Resolution of Findings	12
2.6.	Eligibility for Validation Activities	13
3.	Validation Findings	13
3.1.	Participation under Other GHG Programs	13
3.2.	Methodology Deviations	13
3.3.	Project Description Deviations	13
3.4.	Grouped Project	14
4.	Verification Findings	14
4.1.	Project Implementation Status	14
4.2.	Safeguards	18
4.3.	AFOLU-Specific Safeguards	19
4.4.	Accuracy of GHG Emission Reduction and Removal Calculations	19
4.5.	Quality of Evidence to Determine GHG Emission Reductions and Removals	39
4.6.	Non-Permanence Risk Analysis	39
5.	Verification conclusion	39
	APPENDIX A: Abbreviations	42
	APPENDIX B: references	44

APPENDIX C: Corrective Action Requests, clarification requests and Forward Action Requests	48
---	-----------

1 INTRODUCTION

1.1. Objective

CERPD Inc. has commissioned Shenzhen CTI International Certification Co., Ltd (CTI) to carry out the verification and certification of emission reductions reported for the “The Hyundai Waste Energy Co-generation Project Phase II ” (the project) for the monitoring period 01/07/2017-31/12/2019. This report contains the findings from the verification and includes a verification statement for the verified carbon units.

The objective of verification is to have an independent review ex-post determination by a VVB of the monitored GHG emission reductions that have occurred as a result of the project activity implemented during a defined monitoring period. The evaluation is done against the requirements of the VCS Standard Version 4.3 based on the monitoring report. In order to confirm that the GHG emission reductions sound reasonable and meet the identified criteria, the verification involves the assessment of monitoring plan conformance to VCS rules and applied methodology. Verification is requirement and is seen as necessary to provide assurance on the generation of VCU.

1.2. Scope and Criteria

The scope of the verification is to verify that: (a) the actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan; (b) the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement; and (c) the reported GHG emissions data is sufficiently supported by evidence.

Verification shall ensure that the reported GHG emission reductions are complete and accurate in accordance with the applicable VCS criteria in order to be certified. Verification is conducted using CTI procedures in line with the requirements specified in the VCS Program and ISO14064-3 requirements and applying auditing techniques. Verification team assessed and determines that the implementation and operation of the project activity, and steps to report GHG emission reductions comply with the VCS rules. The verification involved a document review of relevant documentation and interview with the project participants. Verification is not meant to provide any consultancy towards the project participants; however, stated request for clarifications and/or corrective actions may have provided input for improvement of the monitoring.

1.3. Level of Assurance

The verification report expresses a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement. As per the para 3.9.1 of the VCS Standard Version 4.3, the project size categorization belongs to ‘Large Project’ as the expected

annual emission reductions of 1,441,680 tCO₂e is greater than 300,000 tCO₂e. Therefore, according to the requirement of para 4.1.8 (4) of VCS standard Version 4.3 “The threshold for materiality with respect to the aggregate of errors, omissions and misrepresentations relative to the total reported GHG emission reductions and/or removals shall be five percent for projects and one percent for large projects.”, CTI applied a materiality threshold of 1% with respect to omission or misstatements concerning reported quantities of the project activity.

In 2021, CTI was commissioned by the project proponent to conduct the verification for the project. However, due to the COVID-19 pandemic situation, CTI cannot easily to arrange the on-site inspection especially going abroad as the travel restrictions not to ensure site visit to be on scheduled as required by the project proponent. The project proponent has requested for the exemption from the on-site visit as per the COVID-19 Travel Guidance for Projects/46/ and obtained the approval by Verra on 01/12/2021/39/. Therefore, CTI adopted an interview in form of teleconference instead of the on-site inspection.

The quality of teleconference ensures a reasonably good view for the validation team. The document review can be finished in time, and relevant data flows can be accessed remotely. Confidentiality rules was declared to the project proponent by the verification team, and competence and resources of the verification team ensure the verification to finish the remote inspection. The verification team is familiar with the requirements of VCS standards, guidance, procedure and the applied methodology and concluded that the verification can be assessed thoroughly via remote inspection. The below alternatives have been conducted by the verification team as remote audit

1. CTI used teleconference conducting the opening meeting.
2. CTI used teleconference to interview representatives of project proponent, staffs and consultancy, who introduced the construction and operation status of the project, SD contributions, monitoring activities, recording and reporting procedures, etc.
3. CTI discussed the document evidence with project owner based on desk review results.
4. The team discussed findings and conducted close meeting via teleconference with PP.

By the remote inspection, remote interview, and the document review, the verification team confirms the alternative measure used and the information provided by the project proponent are credible and sufficient for the purpose of verification. During the remote inspection, the verification team implemented measures which has been established to mitigate the identified risks, and actual risks were not higher than initially assessed. The remote inspection has been successfully finished.

The verification team decided that another round of remote inspection is unnecessary via reviewing the project participant’s response to clarification requests, corrective action requests and/or forward action requests. The technical review process is able to identify any risks that were not identified during risk assessment stage.

The assessment was conducted to provide a reasonable level of assurance of compliance against the defined audit criteria and materiality threshold within the audit scope. Based on the audit findings, the verification statement reasonably assures that the GHG assertion is materially correct and is a fair representation of the GHG data and information.

1.4. Summary Description of the Project

Sectoral Scope and Project Type

According to the VCS Program Guide (version 4.2)/41/, the project is applicable under the following activity categories:

- Sectoral Scopes: 1. Energy (Renewable/non-renewable) and 4. Manufacturing industries
- Project Type: Waste energy recovery

Project Background

The project is a 400MW cogeneration plant at Hyundai Steel Mill, which is located in Donggok-ri Songsan-myeon Dangjin-gun Chungchongnam-do, Republic of Korea, with east longitude 126°42'11.60"E and north latitude 36°58'58.27"N as verified by using GPS service i.e. Google Earth and checking map, owned and implemented by Hyundai Green power CO., Ltd.. The main purpose of this project activity is to utilize surplus waste gases sourced from the newly blast furnace constructed at the Hyundai Steel Mill (Hyundai Steel) to generate steam and electricity. The waste gases include Blast Furnace Gas (BFG), Coke Oven Gas (COG) and Linz Donawitz Gas (LDG) which are partially recovered by Hyundai Steel and the balance piped to and combusted in the boilers of the proposed project to produce steam. A portion of the steam is returned to the Hyundai Steel for industrial applications, and the rest is utilized by the project activity to generate electricity exported to the Korean national power grid Korea Power Exchange (KPX). The project activity can reduce GHG emissions by replacing the equivalent amount of grid electricity from thermal power and heat energy generated by fossil fuels. However, emission reductions due to heat replacement are not claimed, it is confirmed as conservative.

The project is equipped with 4 sets of 100MW steam turbines (Model; SST-700/SST-900), generators (Model; SGEN6-100A-2P) and boilers. It is expected to supply average electricity of 2,306,076MWh to the grid annually and generate annual emission reductions of 1,441,680tCO₂e approximately. It has been registered as VCS project with Ref. VCS 1146 under VCS Standard Version 3.4., As per the VCS standard, the project start date is 17/05/2013 when the first turbine unit put into operation and began generating GHG emission reductions. The project put full operation since 25/11/2013. The amount of 6,008,438 tCO₂e VCUs have been issued continuously for the monitoring period 01/06/2013-30/06/2017 under VCS scheme.

In this proposed monitoring period 01/07/2017-31/12/2019, total electricity supplied to the grid is 6,168,791.59MWh. The total verified carbon units (VCUs) achieved in the monitoring period are 3,892,640tCO₂e as verified by the verification team via interview with the project proponent and desk review.

2. VERIFICATION PROCESS

2.1. Method and Criteria

A project specific verification and monitoring plan was developed to guide the verification auditing process to ensure efficiency and effectiveness. The purpose of the verification is to present a risk assessment for determining the nature and extent of validation procedures necessary to ensure the risk of auditing error is reduced to a reasonable level. According to the ISO14064-3, the criteria are the policy, procedure or requirement used as reference against which evidence is compared. Therefore, verification of the monitoring plan and the reported project results were measured for compliance against the following criteria:

- VCS Program Guide (version 4.2)/41/
- VCS Standard (version 4.3)/40/
- VCS Program Definitions (Version 4.2) /42/and other relevant requirements defined by Verra;
- CDM methodology ACM0012 (version 4.0.0)/45/s applied by the project.

The verification process derived from all items in the verification criteria stated above. Techniques are based on the project parameters, scope and best professional judgement of the verification team in order to meet a reasonable level of assurance. The verification method of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- A desk review of the registered VCS PD (version 3.6 dated 26/11/2014)/27/, previous VCS verification report/28/ VCS monitoring report/29/ submitted by the client and additional supporting documents with the use of customized verification documents checklist
- Verification planning
- Remote teleconference
- Checking project site, main equipment and project implementation, monitoring equipment, etc. via videos and photos during the teleconference.
- Background investigation and follow-up interviews with personnel of the project developer and related farmers, technicians
- Draft verification reporting
- Resolution of Corrective Action Requests (CARs) and Clarification Requests (CLs)
- Final verification reporting
- Technical review

- Final approval of the verification

Based on the requirements of competency, experience and qualified sectoral scopes, CTI appointed a verification team in accordance with CTI's internal procedures.

Function	Name	Technical competence	Task Performance*
Team Leader	Lin Shunrong	1.2, 14.1, 15.1	☒ DR ☐ SV ☒ RP ☐ TR
Team Member/Expert	Zhang Lei	1.1, 1.2, 4.1, 13.1	☒ DR ☐ SV ☒ RP ☐ TR
Technical Reviewer	Lin Wu	1.1, 1.2, 2.1, 3.1, 4.1, 5.1, 5.2, 10.1, 11.1, 11.2, 12.1, 13.1, 13.2	☒ DR ☐ SV ☐ RP ☒ TR

*DR=Document review; SV=Site visit; RP=Reporting; TR=Technical review

2.2. Document Review

The VCS monitoring report/1/ and supporting background documents related to the project implementation were reviewed. Document review was conducted to ensure consistency with and identify any deviation from VCS program requirements. Desk review included an examination of the project details, data and parameters, and quantification of GHG emission reductions.

Furthermore, the verification team used additional documentation by third parties like host party legislation, technical reports referring to the monitoring or to the basic conditions and technical data.

The references used in the course of this verification are summarized in Appendix 3.

The verification was performed basing on the documents check and inspection during the teleconference, refer to the section 4 of this report for the verification process detail and corresponding documents review.

2.3. Interviews

On 10/12/2021, CTI took a remote interview with the project proponent Hyundai Green power CO., Ltd. and the consultancy CERPD Inc. and local residents to perform the assessment. The key personnel of the project were interviewed or assisted the verification team. Main topics of the interview cover the project implement and operation during the proposed monitoring period, applicability of selected methodology, implementation of project monitoring, emission reduction calculation based on the evidences provided by the project proponent.

The key personnel interviewed/47/ are summarized in the table below:

Interviewed personnel	Position	Subject
Mr. Sung Woo Seok	Team Leader of Energy Management of Hyundai Green power CO., Ltd.	- Construction and implementation of the project activity - Project ownership and organizational structure - Involved personnel, responsibilities and competencies - Status and operation of key equipment - Changes since validation / previous verification - Maintenance - Implementation of the monitoring plan - Data monitoring data, recording and reporting - Monitor equipment and calibration procedures - Quality management procedures and document control - Training and practice of the operational personnel - Working environment - Environmental protection measures - On-going local stakeholder communication - Stakeholder comments - Project's sustainable development contributions.
Mr. Jun Hyung Lee	Engineer of Hyundai Green power CO., Ltd.	
Mr. Young Hun Kim	Technician of Hyundai Green power CO., Ltd.	
Mr. Dong Kuk Kim	Senior Manager of Hyundai Steel	
Ms. Mi Ran Park	Manager of Hyundai Steel	
Mr. Jae Hyak Roh	Local resident	
Mr. Sung June Cho	Local resident	
Mr. Jong Bum Kim	Director of CERPD Inc.	
Mr. Jun Wang	Project Manager of CERPD Inc.	- 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

2.4. Site Inspections

The exemption from site visit was approved by Verra on 01/12/2021/39/. Via the assessment during the teleconference on 10/12/2021, CTI has applied standard auditing techniques to assess the quality of information provided. The following aspects of the project activity have been verified:

- An assessment of the implementation and operation of the registered project activity is as per the registered VCS PD of the project activity;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the registered VCS PD;

- A cross-check between information provided in the monitoring report and data from other sources such as daily and monthly records, Electricity Sales Transaction Notes(ETNs) and LNG consumption invoices;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the registered VCS PD and the selected methodology;
- A review of calculations and assumptions made in determining the GHG data and emission reductions; and
- An identification that quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

The data presented in the monitoring report were assessed by review of the detailed project documentation and production records, as well as by interviews with personnel from the project developer Hyundai Green power CO., Ltd. and project consultant CERPD Inc., and observation of collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results, to verify the correct application of the approved monitoring methodology and the determination of the emission reductions.

In addition all parameters required by the monitoring methodology ACM0012 (version 4.0.0), and the management system were assessed during the verification.

2.5. Resolution of Findings

A corrective action request (CAR) shall be raised, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project proponents.

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

The verification team identified five CLs and two CARs in this monitoring period, and no FAR was raised. The CLs and CARs were satisfactorily addressed by the project proponents in the revised monitoring report and PD (refer to Appendix A for further details).

2.5.1. Forward Action Requests

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

CTI confirmed that there was no FAR identified in previous verification (Version 01, dated 20/11/2013)/28/, and no FAR was raised during this verification.

2.6. Eligibility for Validation Activities

The project has been completed the validation under the VCS standard 3.4 by the VVB First Environment, Inc. The verification for the proposed monitoring period is the first one undertaken by CTI. CTI has been accredited in Sectoral Scopes 1 and 4 on validation and verification and thus is eligible for the verification on the proposed project.

3. VALIDATION FINDINGS

3.1. Participation under Other GHG Programs

The project only sought the registration with the VCS Program and has been successfully registered as a VCS allocated with VCS ID 1146 for 10-year crediting period 17/05/2013-16/05/2023.

Via checking the UNFCCC, GS and EU ETS, Korean Emission Trading Scheme (KETS), it is confirmed the project has neither been registered nor seeking registration under other GHG programs or other mechanism including GHG allowance trading. CTI verified that the project is only participated in VCS program, and the net GHG emission reductions generated by the project during this monitoring period only requests for VCUs issuance, without any double counting under any emission trading programs or mechanisms.

Also, via checking GS, IREC and the Climate Action Reserve to determine if the project is producing other environmental credits, the verification team confirmed that the project is not listed on these registries and therefore there is no other environmental credit (for example renewable energy certificate) which has or will be produced by or obtained for the project.

3.2. Methodology Deviations

The verification process has assessed all factors and issues that constitute the basis for emission reductions from the project according to the applicable CDM methodology ACM0012 (version 4.0.0)/45/. There was not any methodology deviation applied to this project. Details refer to section 4.1.

3.3. Project Description Deviations

There is a deviation for determining the monitoring parameter $EC_{PJ,y}$ which is the electricity consumed by the booster fans being used to transport waste gases and thus is accounted for as project emissions. As per the registered VCS PD (version 3.6, dated 26/11/2014), $EC_{PJ,y}$ will be measured by electricity

meters and monthly recorded. However, due to the absence of the meters for monitoring the electricity consumed by the fans during this monitoring period, a conservative approach is applied that the $EC_{PJ,y}$ is calculated in maximum in terms of the rated capacity of the fans with the assumption of round-clock operation during the proposed monitoring period. Via the interview and checking the manufactures' specification/12/-/14/, verification team confirmed that:

- 2 sets of fans with unit rated capacity of 450kW in operation for COG under the pressure of 400-600 mm Hg;
- 1 set of fan with unit rated capacity of 240kW in operation for LDG under the pressure of 400-600 mm Hg;
- There is no fan for BFG since the BFG gas has higher pressure of 800-1000 mm Hg enough for driving the gas flow.

Therefore, the amount of $EC_{PJ,y}$ for a monitoring period is accounted as:

Fan for COG: $450\text{kW} \times 2 \text{ sets} \times 24\text{hrs/day} \times \text{days of the monitoring period}/1,000$

Fan for LDG: $240\text{kW} \times 1 \text{ set} \times 24\text{hrs/day} \times \text{days of the monitoring period}/1,000$

The deviation was also applied for the previous 1st monitoring period and approved by Verra. It is confirmed by the verification team the deviation leads to more conservative value resulting in the lower overall emission reductions of the project activity. It is confirmed the deviation has no impact on the applicability of the methodology and conservativeness principle.

The verification team assessed through virtual inspection and document review that except the above deviation, all other physical features of the proposed project activity including data monitoring, reporting and collecting systems have been implemented in accordance with the registered VCS PD.(version 3.6 dated 26/11/2014) without any change.

3.4. Grouped Project

The project was not a grouped project; hence this clause is not applicable.

4. VERIFICATION FINDINGS

4.1. Project Implementation Status

Project Implementation in accordance with the registered project design document

Through the virtual interview with the project proponent and reviewing the project operation against the description in the registered VCS PD (version 3.6 dated 26/11/2014)/27/, CTI confirmed that the project is newly build waste energy recovery co-generation power plant within Hyundai Steel Mill, which is developed by Hyundai Green power CO., Ltd. and locates in Donggok-ri Songsan-myeon Dangjin-gun

Chungchongnam-do, Republic of Korea. The geographical coordinates are verified by GPS system through the interview as east longitude 126°42'11.60"E and north latitude 36°58'58.27"N.

As confirmed through checking the manufactures' specification/12/-/14/, the total installed capacity is 400MW equipped with 4 sets of 100MW steam turbines (Model; SST-700/SST-900), generators (Model; SGEN6-100A-2P) and boilers. The project activity utilizes surplus waste gases sourced from the blast furnaces at Hyundai Steel, including Blast Furnace Gas (BFG) caused by melting iron ore, Coke Oven Gas (COG) by the dry distillation of flaming coal, and Linz Donawitz Gas) (LDG) from the decarburization process in which impurities are got rid of from the melted iron. The waste gases are partially recovered by Hyundai Steel and the rest is sent to and combusted in the boilers of the project to generate steam. A portion of the steam is returned to the Hyundai Steel for industrial applications, and the rest is utilized by the project activity to generate electricity exported to the national grid KPX . Based on the interview and desk review, the verification team confirms that all physical features i.e. gas supply system, turbines and generators, and auxiliary equipment of the project described in the registered VCS PD are in place and the project has been operated as per the registered VCS PD/27/.

As verified during the interview and by checking the on-site LNG consumption record/8/ and invoices/9/, it is confirmed the LNG was used in small quantities with waste gas to make up caloric deficiencies or for startup of power engines during this monitoring period. There are no other sources of GHG emissions attributable to the project activity. The project boundary is consistent with that in the registered VCS PD (version 3.6 dated 26/11/2014).

The project started operation on 17/05/2013 as confirmed through the interview and against the daily operation and maintenance record for power plant/20/. The electricity generated by the project activity is supplied to the KPX, which can be confirmed by the the Power Purchase Agreement signed between Hyundai Green power CO., Ltd. and the national grid KPX/3/. The control system EMS-IRTV at the power plant is automated and assures continuous operation, including monitoring on malfunction of equipment. By checking the daily operation and maintenance records/20/and EMS-IRTV system/21/, there were cumulative 183.5hours of shutdowns for regular inspections and normal maintenance of the facility during this monitoring period, CTI can confirm that no serious malfunction happened that impacts on the project implementation and emission reductions calculation, and the plant was under a normal operation as expected in this monitoring period.

On-site training for the related procedures including monitoring, recording and reporting was verified to be in place/22/ and their implementation was confirmed by interview with the key operators/47/ and observing the operation.

Via interview and document reviews i.e. checking daily operation and maintenance records/20/, diagram of flow chart/4/ and power connection system/5/, equipment specifications/12/-/14/ etc and evidences regarding monitoring activities/6/-/11/, /15/-/22/, the verification team confirmed that:

- the project implementation is in accordance with the registered PD;
- there is no other proposed or actual change to the registered PD during this monitoring period;

- the project is completely operational, and all required equipments and instruments including standby and operating procedures for the same are available and implemented in an appropriate manner;
- Except the deviation on the procedure for determination of monitored parameter $EC_{PJ,y}$ as stated in Section 3.3 above, all necessary monitoring instruments are installed;
- neither mistakes nor malfunction on monitoring meters have been observed during this monitoring period as illustrated in details in Section 4.4 below.
- the control system at the power plant is automated and assures continuous operation, including monitoring on malfunction of equipment;
- no serious malfunction happened and the plant was under a normal operation as expected in this monitoring period.

In conclusion, verification team was able to confirm that the project implementation is in accordance with the project description contained in the registered VCS PD/27/ and the deviation applied for determining the monitoring parameter $EC_{PJ,y}$ approved for the previous 1st verification.

CL 1 was raised for clarification of the technology applied by the project i.e. main equipment including the technical specifications (type/model, capacity), which has successfully closed, Refer to Appendix 3 for details.

CL 2 was raised for providing the diagram showing the location of monitoring equipment and monitoring points, which has successfully closed, Refer to Appendix 3 for details.

Participation or any rejection under any other GHG programs, any other form of environmental credit or emissions trading program since validation or previous verification

The project only sought for the VCS registration and has been registered as a VCS project with VCS ID 1146.

The verification team has checked other GHGs programs such as UNFCCC, GS, KETS, EU ETS, IREC and Climate Action Reserve and based on the interview with the project proponent, it is confirmed that except VCS scheme:

- No evidence showing that the project has participated or been rejected under any other GHG programs since validation or previous verification;
- There is no observation that the project has received or sought any other form of environmental credit, or has become eligible to do so since validation or previous verification;
- The project is completely voluntary VCS project, not included in an emissions trading program or any other mechanism that includes GHG allowance trading.

As verified via interview with the project owner and by reviewing the laws and regulations of Korean Emission Trading Scheme (KETS) “Act on Allocation and Trading of Greenhouse Gas Emission Permits” /32/and “Guidelines on Allocation, Adjustment, and Revocation of Greenhouse Gas Emission Permits” /33/all power companies are required to comply with the KETS for allowance allocation of GHG

emissions. However, the allowance allocation is just counted based on the GHG emissions caused by the power company. Thus, the emission reductions generated by the project activity are irrelevant to the emission allowance allocation of the project owner.

Furthermore, as per the laws and regulations of Korean Emission Trading Scheme (KETS), and the regulation regarding the KOC projects “*Guidance on external project feasibility assessment and reduction certification*”/34/, only Korean Offset Credits (KOC) can be used for emission trading in KETS, which is the certified GHG emission reductions generated by the registered KOC projects. As a voluntary mechanism, there is no mandatory requirement for the GHG emission reduction projects to be registered as KOC projects. It is also confirmed by the verification team via checking the KOC registration platform/35/, neither the project activity has been registered as KOC project nor the project owner has any registered KOC project. Thus, the emission reductions generated by project activity cannot be included in the KETS.

Moreover, a letter of assurance has been provided by the project proponents to confirm the project was not and would be not registered with another GHG program other than VCS.

SD contributions resulted by implementation of the project activity

Through the interviews with the project proponent and local residents and by checking the project plan and actions for supporting undertakings in surrounding areas/20/, the verification team agrees on the following points regarding to the promotion of sustainability development goals (SDGs) defined by UNDP by the project activity:

- **SDG 7, Indicator 7.1 Providing electricity to local residents by applying clean technology**
Generating and providing electricity to local area through recovering waste gases from steel mill, thus mitigating the air pollution and its adverse impacts on human health, promoting sustainable economic development in local area. During this monitoring period, the electricity supply is confirmed as 6,168,791.59MWh. By checking VERRA website (<https://registry.verra.org/app/projectDetail/VCS/1146>), it is confirmed that since operation of the project activity, the cumulative energy supplied to local area was 15,765,459.59MWh.
- **SDG 8, Indicator 8.5 Number of decent job opportunities provided**
Through interviews with project proponent, staffs and local residents, verification of employee confirmation letter of hiring local residence and evidence of legal minimum wage in Korea provided by PP/37/ and official statistics on legal minimum wage in Korea/38/, it was confirmed that the project activity provided 136 employment opportunities during the project operation and construction, providing local residents with full and productive employment and decent work including high level salary and variety of employee benefits, such as insurance premiums, transportation, tuition fees and child support fees. Hence, the contribution to SDG8 has been confirmed and the provisions for monitoring and reporting this goal is verified as reasonable.
- **SDG 13, Indicator Tonnes of greenhouse gas emissions avoided or removed**

During this monitoring period, the emission reductions achieved were 3,892,640tCO₂e. By checking the VERRA website (<https://registry.terra.org/app/projectDetail/VCS/1146>), it is confirmed that since operation of the project activity, the cumulative emission reductions achieved were 9,901,078tCO₂e.

In conclusion, verification team was able to confirm that the project implementation is in accordance with the project description contained in the registered VCS PD/27/ and the deviation applied for determining the monitoring parameter EC_{PJ,y} approved for the previous verification. All required equipments and procedures are available and implemented in an appropriate manner. All necessary monitoring instruments are installed and operated. The project is completely operational and the same has been confirmed. Neither mistakes nor malfunction on main meters have been observed during this monitoring period.

4.2. Safeguards

4.2.1. No Net Harm

EIA of the project has been approved by the government. By checking the EIA summary and conclusion provided in the registered VCS PD, it is confirmed there is no potential negative environmental and socio-economic impact identified, a series of meetings involved with local residents had been held by the project proponent to investigate their comments on the project implementation, based on the survey proper mitigation measures have been adopted during the project construction and operation to minimize the impacts of noise, pollution, and spreading of thermal effluent concerned by the local residents. Also, it is verified there is no potential environment or social economic matter was found during this monitoring period as confirmed through interview and checking EIA and project plan/23/, the verification team verified proper actions for supporting undertakings in surrounding areas/23/ were conducted by project proponent during this monitoring period regarding minimizing pollutants, noise control, warm water discharging method analysis, and recycling methods of waste energy resource. Furthermore, as verified in Section 4.1 above, the project activity contributes achievement of sustainable development. Therefore, the implementation of the project activity is beneficial to local social economic environment.

4.2.2. Local Stakeholder Consultation

As per the registered VCS PD, the local stakeholder's consultation was done on 21/12/2010-22/12/2010 through stakeholder meetings. The opinions expressed by the stakeholders were recorded during the meeting and are available on request. Corresponding to the comments received from local stakeholders, the project proponent has made and implemented a series of solutions to minimize the potential impacts concerned by the local stakeholders. All such conclusion has been verified through interview and check registered VCS PD.

For this monitoring period, the project proponent has undertaken communications with local stakeholders by means of questionnaire survey on 11/05/2017, 05/09/2017, 14/12/2018 and

04/11/2019 to collect feedback and comments from stakeholders. It was verified by checking survey records/24/ and interviewing with the local residents and project proponents/47/ the verification team confirmed that on-going communication mechanism was well set up and carried out at periodic intervals by the project proponents during this monitoring period, and there are no negative comments nor grievance received for the project. Furthermore, the project proponent also invested several projects to improve the local living conditions, including roads improving, school repairing, scholarship as verified via interview and by checking project plan and actions for supporting undertakings in surrounding areas/23/.

CL 5 was raised for clarification of the ongoing communication with local stakeholders during this monitoring period, which has successfully closed, Refer to Appendix 3 for details.

4.3. AFOLU-Specific Safeguards

For non-AFOLU projects, this section is not required.

4.4. Accuracy of GHG Emission Reduction and Removal Calculations

Compliance of monitoring plan with monitoring methodology

CTI is able to confirm that the monitoring plan in the registered VCS PD (version 3.6 dated 26/11/2014) is in accordance with the approved methodology applied by the project activity, i.e.ACM0012 (version 4.0.0).

Compliance of monitoring with the monitoring plan

As verified by CTI mentioned in Section 3.3 above, a deviation for determining the parameter $EC_{PJ,y}$ is adopted during this monitoring period since lack of measuring instruments to monitor the on-site electricity consumption by the booster fans. Besides it is verified that the monitoring has been carried out in accordance with the monitoring plan contained in the registered VCS PD (version 3.6 dated 26/11/2014). CTI confirms that all parameters stated in the monitoring plan are monitored or calculated and reported appropriately. The parameters required to be monitored by the monitoring plan as per the monitoring methodology ACM0012 (version 4.0.0) and the management system were assessed. The monitoring report lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, recording, calculation and reporting) for these parameters is provided. The information flow for each parameter is further verified in the following sections.

Parameters fixed ex ante

By means of comparison of the MR/1/ and the ER calculation/2/ with the registered VCS PD/27/, the verification team has checked whether all parameters fixed ex-ante have been applied correctly.

The parameters that are fixed ex ante and directly applied for calculation of the emission reductions in the MR are following. The baseline grid emission factor EF_y is calculated and fixed ex ante based on the

relevant basis parameters $EF_{grid,OM,y}$, $EF_{grid,BM,y}$, $COEF_{j,y}$, NCV_i and $EF_{CO2,i,y}$ in the registered PD which are not described in detail here.

Parameters	Description	Values applied	Demonstration by Verification team
EF_y	Carbon emission factor of Korea National power grid.	0.6345	An ex-ante fixed value during the crediting period, the value is verified as consistent among the registered VCS PD/27/.
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y	20%	A default value according to “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, ex-ante fixed value during the crediting period, the value is verified as consistent among the registered VCS PD/27/ and applied tool.
f_{cap}	Factor that determines the energy that would have been produced in project year y using waste energy generated at a historical level, expressed as a fraction of the total energy produced using waste source in year y.	1	A default value for greenfield facility as per the ACM0012, ex-ante fixed during the crediting period, the value is verified as consistent among the registered VCS PD/27/ and the applied methodology.
F_{wcm}	Fraction of total electricity generated by the project activity using waste energy.	1	Ex-ante fixed value during the crediting period, the value is verified as consistent among the registered VCS PD/27/ and

		applied methodology.
--	--	----------------------

In conclusion, the parameter fixed ex ante applied the MR is checked as in line with the registered VCS PD/27/.

Parameters monitored, monitoring equipment and calibration

CTI conducted document review and performed virtual inspection with project stakeholders to:

- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the registered VCS PD;
- A cross-check between information provided in the monitoring report and data from other sources such as daily and monthly records, Sales Transaction Notes(ETNs) and LNG invoices;
- An identification that quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

According to the registered monitoring plan, the parameters to be monitored in the MR during this monitoring period are checked as below:

Data / Parameter	EG _{j,y}
Data unit	MWh
Description	Quantity of electricity supplied to the grid by the project activity during the year y.
Measured /Calculated /Default:	Measured by main meters M1-M4, and backup meters M5-M8
Value monitored	6,168,791.59
Measurement Frequency	Continuously measured, daily recorded and monthly aggregated
QA/QC Procedures Applied, including calibration	The verification team has checked the QA/QC procedure undertaken by the project activity via the interview and by reviewing the following documents: - Daily reading and monthly aggregation records of the electricity supply to the grid /6/ - ETN for the electricity delivered to the grid/7/ - Calibration Records for the electricity meters /15/ - VCS Monitoring Manual /19/ - Daily operation and maintenance records /20/ - EMS-IRTV system/21/ - Training records /22/ It is confirmed the monitoring data are aggregated monthly by the project owner

	and cross check with the electricity transaction notes (ETNs) issued by KPX. Calibrations were conducted every 3.5 years to be consistent with the monitoring plan. The power plant was under normal operation during this monitoring period. Staff were trained regularly during this monitoring period to maintain continuous competency for operation and monitoring.																																								
Verification Observations/Assessment	Based on the interview and checking the connection diagram and photos of meters, it is confirmed that the main meters M1-M4 and backup meters M5-M8 are installed at the on-site transformer to monitor the electricity supply to the grid KPX. The verification team had checked the location of the meters against the diagram of power connection system/4/ and found them to be consistent. The meter readings are continuously measured and daily recorded by trained staff each day, then the readings were aggregated at 24:00 on the last day of each month/6/. The electricity transaction notes (ETNs)/7/ issued by KPX have been used for cross-reference of electricity supply. Through the crosscheck, it is confirmed the monthly records of electricity supply used in the MR and ER calculation during this monitoring period are complete and consistent with the ENTs. The data reported in the monitoring report and ERs calculation spreadsheet has been verified against primary data/6//7/ by the verification team. It is concluded that supporting references and data required to determine the net electricity supplied to the grid by the project is found to be complete and transparent and data reported without manual transposition errors. By checking the calibration certificates, it is confirmed the monitoring meters have been calibrated as per the monitoring plan covering this monitoring period. The relevant information of the calibration is listed as below: <table><tr><td>Item</td><td>Main meter M1</td><td>Main meter M2</td><td>Main meter M3</td><td>Main meter M4</td></tr><tr><td>Type</td><td colspan="4">ION</td></tr><tr><td>SN</td><td>PT1203A32301</td><td>PT1203A32401</td><td>PT1203A32501</td><td>PT1203A32601</td></tr><tr><td>Accuracy class</td><td>0.2s</td><td>0.2s</td><td>0.2s</td><td>0.2s</td></tr><tr><td>Calibration frequency</td><td>3.5 years</td><td>3.5 years</td><td>3.5 years</td><td>3.5 years</td></tr><tr><td>Calibration Date</td><td>28/10/2016 29/01/2019</td><td>28/10/2016 25/04/2019</td><td>28/10/2016 24/04/2019</td><td>28/10/2016 29/01/2019</td></tr><tr><td>Validity</td><td>28/04/2019 29/01/2023</td><td>28/04/2019 25/04/2023</td><td>28/04/2019 25/04/2023</td><td>28/04/2019 29/01/2023</td></tr><tr><td>Calibration entity</td><td colspan="4">Korea Testing Certification(KTC)</td></tr></table>	Item	Main meter M1	Main meter M2	Main meter M3	Main meter M4	Type	ION				SN	PT1203A32301	PT1203A32401	PT1203A32501	PT1203A32601	Accuracy class	0.2s	0.2s	0.2s	0.2s	Calibration frequency	3.5 years	3.5 years	3.5 years	3.5 years	Calibration Date	28/10/2016 29/01/2019	28/10/2016 25/04/2019	28/10/2016 24/04/2019	28/10/2016 29/01/2019	Validity	28/04/2019 29/01/2023	28/04/2019 25/04/2023	28/04/2019 25/04/2023	28/04/2019 29/01/2023	Calibration entity	Korea Testing Certification(KTC)			
Item	Main meter M1	Main meter M2	Main meter M3	Main meter M4																																					
Type	ION																																								
SN	PT1203A32301	PT1203A32401	PT1203A32501	PT1203A32601																																					
Accuracy class	0.2s	0.2s	0.2s	0.2s																																					
Calibration frequency	3.5 years	3.5 years	3.5 years	3.5 years																																					
Calibration Date	28/10/2016 29/01/2019	28/10/2016 25/04/2019	28/10/2016 24/04/2019	28/10/2016 29/01/2019																																					
Validity	28/04/2019 29/01/2023	28/04/2019 25/04/2023	28/04/2019 25/04/2023	28/04/2019 29/01/2023																																					
Calibration entity	Korea Testing Certification(KTC)																																								

	Item	Backup meter M5	Backup meter M6	Backup meter M7	Backup meter M8
	Type	Actaris			
	SN	62014885	62014886	62014887	62014889
	Accuracy class	0.5s	0.5s	0.5s	0.5s
	Calibration frequency	3.5 years	3.5 years	3.5 years	3.5 years
	Calibration Date	28/10/2016 29/01/2019	28/10/2016 25/04/2019	28/10/2016 25/04/2019	28/10/2016 03/01/2019
	Validity	28/04/2019 29/01/2023	28/04/2019 25/04/2023	28/04/2019 25/04/2023	28/04/2019 03/01/2023
	Calibration entity	Korea Testing Certification(KTC)			
	Calibration records and accreditation certificates/15//16/ have been verified by the verification team, and confirmed to be accurate, the calibration had been conducted in line with the frequency required by the monitoring plan in the registered VCS PD/27/.				
	CAR 1 was raised for providing crosscheck procedure in ER spreadsheet for reading records of electricity supply to ensure baseline emission calculation is correct and conservative, which has been successfully closed, Refer to Appendix 3 for details CL 3 was raised for clarifying the calibration and valid dates of monitoring meters for EG _{j,y} , which has been successfully closed, Refer to Appendix 3 for details.				
Conclusion	CTI confirms that: - All meters have been installed in accordance with the monitoring plan; - The meters' accuracy is in line with the requirement of the monitoring plan; - The calibration frequency of the meters is annual, which is in line with the monitoring plan. And the calibrations are verified to be valid for the whole reporting period.				

Data / Parameter	EC _{PJ,y}
Data unit	MWh
Description	Quantity of electricity consumed by the project electricity consumption source j in year y.
Measured	Calculation with the rated capacity of fans as the deviation method stated in Section 3.3 above.

/Calculated /Default:	As per the deviation, a conservative approach was sought, $EC_{PJ,y}$ is calculated as the maximum based on the rated capacity specified by the manufacturer with the assumption that the fans were under round-clock operation during this monitoring period, which is deemed conservative by the verification team.
Value Monitored	25,007.04
Measurement Frequency	NA
QA/QC Procedures Applied, including calibration	The verification team has checked the QA/QC procedure undertaken by the project activity via the interview and by reviewing the following documents: - Manufacture's specification of COG fans/13/ - manufacture's' specification of LDG fans/14/ - VCS Monitoring Manual /19/ - Daily operation and maintenance records /20/ - EMS-IRTV system/21/ - Training records /22/ It is confirmed the equipment was under normal operation during this monitoring period. Staff were trained regularly during this monitoring period to maintain continuous competency for the operation and monitoring,
Verification Observations/Assessment	Via the interview and checking the manufactures' specification/13//14/, verification team confirmed that: - 2 sets of fans with unit rated capacity of 450kW in operation for COG under the pressure of 400-600 mm Hg; - 1 set of fan with unit rated capacity of 240kW in operation for LDG under the pressure of 400-600 mm Hg; - There is no fan for BFG since the BFG gas has higher pressure of 800-1,000 mm Hg enough for driving the gas flow.
Conclusion	This deviation adopted uses the maximum electricity consumption, resulting in a less emission reductions accounting. Therefore, this is conservative.

Data / Parameter	$AF_{i,j,y}$
Data unit	Nm^3
Description	LNG consumed on-site for power generation.
Measured /Calculated /Default:	Measured

Measurement Frequency	Continuously measured, daily recorded and monthly reported									
Value Monitored	1,151,978									
QA/QC Procedures Applied, including calibration	The verification team has checked the QA/QC procedure undertaken by the project activity via the interview and by reviewing the following documents: - Daily reading record and monthly aggregation record of the LNG gas consumption /8/ - Invoices for the LNG gas consumption/9/ - Confirmation letter of normal condition for the flow meters/17/ - VCS Monitoring Manual /19/ - Daily operation and maintenance records /20/ - EMS-IRTV system/21/ - Training records /22/ It is confirmed the monitoring data are aggregated monthly by the project owner and cross check with the invoices issued by LNG supplier. The flow meters will be calibrated in case of abnormal operation. Staff were trained regularly during this monitoring period to maintain continuous competency for operation and monitoring.									
Verification Observations/Assessment	Based on the interview and checking the connection diagram and photos of flow meters, it is confirmed that two meters installed to monitored the LNG consumption. The verification team had checked the location of the meters against the diagram/4/and found them to be consistent. As confirmed though the interview, by checking the daily operation and maintenance records/20/ and confirmed by the project proponent, the flow meter SN 10513238 was replaced on 15/11/2017 with a new meter 10528940, both meters were under normal condition during this monitoring period. The meter readings are continuously measured and daily recorded by trained staff then the readings were aggregated on the last day of each month/8/. The Invoices/9/ issued by the LNG supplier have been used for cross-reference. It was verified the invoices were issued the sum for both the proposed project (1146) and the Phase I project (786). The verification team had checked records of each project against the invoices, and confirmed the consistency of the monthly records applied in the MR and ER calculation during this monitoring. Supporting references and data required to determine the LNG consumption by the project are found to be correct, complete and transparent. Information of the flow meters is shown as below: <table><tr><td>Serial Number</td><td>Model</td><td>Accuracy</td><td>Remark</td><td>Calibrate</td></tr></table>					Serial Number	Model	Accuracy	Remark	Calibrate
Serial Number	Model	Accuracy	Remark	Calibrate						

	10513238 (old)	G4000	±0.62%	Meter 10513238 replaced by new meter 10528940 on 15/11/2017.	KOGAS
	10528940 (new)	SM-RI-X	±0.5%		
	Confirmation letter for normal condition of flow meters/17/ and calibrations/18/ have been verified by the verification team, and confirmed flow meters were operated normally within the accuracy tolerance.				
	CAR 2 was raised for providing crosscheck procedure in ER spreadsheet for reading records of LNG consumption to ensure project emission calculation is correct and conservative, which has been successfully closed, Refer to Appendix 3 for details.				
	CL 4 was raised for clarifying whether the flow meters for monitoring LNG consumption were under normal condition during the proposed monitoring period, which has been successfully closed, Refer to Appendix 3 for details.				
Conclusion	CTI confirms that: - The equipment for monitoring has an appropriate accuracy and has been controlled in accordance with the registered VCS PD; - The monitoring results have been recorded consistently as per the approved frequency in the registered VCS PD; and - QA/QC procedures have been applied in accordance with the registered PD.				

Data / Parameter	NCV _i (for AF _{i,j,y} calculation)
Data unit	TJ/Gg
Description	Net calorific value for fuel LNG
Measured /Calculated /Default:	Default value from IPCC 2006
Measurement Frequency	Updated upon the upon the Updated IPCC revision
Value Monitored	50.4
QA/QC Procedures Applied, including	IPCC default values at the upper limit of the uncertainty at a 95% according to "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion".

calibration	
Verification Observations/Assessment	In the registered VCS PD, the value is sourced from KOREA GAS CORPORATION. Since the project proponent did not record the value of NCV_i during the monitoring period, a conservative approach is adopted, according to "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" IPCC default values at the upper limit of the uncertainty at a 95% was considered.
Conclusion	It is confirmed the value applied in the MR and ER calculation is consistent with the current IPCC 2006, which results in a less emission reductions accounting. Therefore, this is conservative.

Data / Parameter	$EF_{CO_2,i,y}$
Data unit	kgCO ₂ /TJ
Description	CO ₂ emissions factor for LNG
Measured /Calculated /Default:	Default value from IPCC 2006
Measurement Frequency	Updated upon the IPCC revision
Value Monitored	58,300
QA/QC Procedures Applied, including calibration	IPCC default values at the upper limit of the uncertainty at a 95% according to "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion".
Verification Observations/Assessment	The value is sourced from IPCC 2006 as per the applied tool.
Conclusion	The verification team confirmed the value in the MR and ER calculation are correct in line with the current IPCC 2006 and compliance with the monitoring plan.

Data / Parameter	Abnormal operation of the project facility including emergencies and shut down
Data unit	Hours

Description	The hours of abnormal operation of parts of project facility that can have an impact on waste energy generation and recovery
Measured /Calculated /Default:	Measured
Measurement Frequency	Daily recorded and aggregated annually
Value Monitored	183.5
QA/QC Procedures Applied, including calibration	The verification team has checked the QA/QC procedure undertaken by the project activity via the interview and by reviewing the following documents: - Shutdown records downloaded from EMS-IRTV system/21/ - Daily operation and maintenance records/20/ - Daily reading and monthly aggregation records of the electricity supply to the grid /6/ - VCS Monitoring Manual /19/ It is confirmed the operation status can be automatically recorded by the EMS-IRTV system/21/,and responsible staff collected and counted the time in case of the abnormal conditions occurred.
Verification Observations/Assessment	As confirmed though the interview and by checking the records downloaded from EMS-IRTV system, daily operation and maintenance records/20/ and daily electricity records/6/, the downtimes were due to the normal maintenance of the project activity and there was no electricity generated and recorded during the downtimes.
Conclusion	For regular shut down during this monitoring period, no impact on emission reductions since there is no electricity generated, thus it does not impact on the emission reductions calculation.

To be concluded, monitoring of data and parameters related to the GHG emission reductions in the project activity have been carried out in accordance with the approved monitoring plan.

Data management and control

Hyundai Green power CO., Ltd. is responsible for operation and routine maintenance of power plant under the project activity. The quality assurance and quality control procedures have been addressed in the VCS monitoring manual and management procedure/19/, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. By interview with the staff/47/ and check records /6//8//20//21/during interview, it can be confirmed that the monitoring management system is implemented following the project management and monitoring manual.

Monitoring devices have been calibrated and maintained periodically to ensure the accuracy of measurement. Calibration records of instruments used in measurements were made available during the verification and found to be valid for the entire period of the verification. Competence and training records of in-plant personnel engaged in measurement of plant parameters were presented during verification and found to be in order.

As the above and document review, verification team considers that the project activity operated properly in the way complying with the implementation plan and monitoring plan stipulated in the registered VCS PD (version 3.6 dated 26/11/2014) and the monitoring was performed in a transparent and comprehensive manner during this monitoring period.

Emission reduction calculation

CTI confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

According to the applied methodology, the emission reductions are determined as the difference between the baseline emissions (BE_y), project emissions (PE_y) and leakage (L_y):

$$ER_y = BE_y - PE_y - L_y$$

Capping factors

In accordance with Annex 3 of ACM0012 version 4.0.0 and the registered VCS PD, the project may only generate VCUs where it can be demonstrated that the project has not resulted in a decrease in waste energy utilization at the production facility (Dangjin Hyundai Steel Mill) compared to a baseline. The baseline utilization for the production facility was previously validated and fixed at 39.50%. Energy utilization data for this purpose are monitored continuously, aggregated daily and monthly, and compiled into the Energy consumption data statistics/11/. A facility operator and a manager both authenticate the monthly reports. The energy utilization during this monitoring period is summarized as Table 1 below:

Table 1 Energy utilization data

Year	Waste Gas	The project activity	Hyundai Mill	Total
01/07/2017- 31/12/2017	COG	23.19%	76.81%	100%
	BFG	79.19%	20.81%	100%
	LDG	97.29%	2.71%	100%
	Total	59.78%	40.22%	100%
2018	COG	28.28%	71.72%	100%
	BFG	72.21%	27.79%	100%
	LDG	97.84%	2.16%	100%

	Total	59.35%	40.65%	100%
2019	COG	23.29%	76.71%	100%
	BFG	80.16%	19.84%	100%
	LDG	96.59%	3.41%	100%
	Total	59.44%	40.56%	100%

Via reviewing the Energy consumption data statistics/11/ by the verification team, it is confirmed the annual waste gas utilization by the production facility was greater than 39.50% that demonstrates project implementation during this monitoring period did not decrease the internal utilization of waste gases relative to the ratio confirmed at validation, thereby conforming to the requirement.

Baseline emissions

According to the registered VCS PD and confirmed at the validation, the project has no fossil fuel used for flaring the waste gas in the baseline, thus $BE_{flst,y}$ is 0; and the proposed project doesn't claim GHG emission reductions from heat supply for the steel mill application for conservativeness, thus $BE_{Ther,y}$ is 0. The baseline emission calculation is indicated as the following:

$$BE_y = BE_{En,y} + BE_{flst,y} = BE_{En,y} = BE_{Elec,y} + BE_{Ther,y} = BE_{Elec,y}$$

Where:

BE_y The total baseline emissions during the year y in tCO₂.

$BE_{En,y}$ The baseline emissions from energy generated by the project activity during the year y in tCO₂.

$BE_{flst,y}$ Baseline emissions from fossil fuel combustion, if any, either directly for flaring of waste gas or for steam generation that would have been used for flaring the waste gas in the absence of the project activity (tCO₂).

$BE_{Elec,y}$ Baseline emissions from electricity during the year y in tCO₂.

$BE_{Ther,y}$ Baseline emissions from thermal energy (due to heat generation by elemental processes) during the year y (tCO₂).

$$BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_j \sum_i (EG_{i,j,y} * EF_{Elec,i,j,y})$$

Where:

$BE_{elec,y}$ Baseline emissions due to displacement of electricity during the year y (tCO₂)

$EG_{i,j,y}$ The quantity of electricity supplied to the recipient j by generator, which in the absence of the project activity would have been sourced from source i (the grid) during the year y in MWh.

$EF_{elec,i,j,y}$ The CO₂ emission factor for the electricity source i (gr for the grid), displaced due to the project

activity, during the year y (tCO₂/MWh).

f_{wcm} Fraction of total electricity generated by the project activity using waste energy. This fraction is 1 if the electricity generation is purely from use of waste energy.

f_{cap} Factor that determines the energy that would have been produced in project year y using waste energy generated at a historical level, expressed as a fraction of the total energy produced using waste source in year y. The ratio is 1 if the waste energy generated in project year y is the same or less than that generated at a historical level.

As confirmed at the validation, the f_{wcm} is determined as 1 as the electricity generation purely from use of waste energy; f_{cap} of this project is 1 as the project is a Greenfield power plant.

To be concluded, baseline emissions is calculated as $BE_y = BE_{Elec,y} = f_{cap} \times f_{wcm} \times EG_{j,y} \times EF_y$

EF_y is carbon emission factor of Korea National power grid validated ex-ante fixed as 0.6345 tCO₂e/MWh during the crediting period as per the registered VCS PD/27/. $EG_{j,y}$ is the electricity supply to the grid during this monitoring period sourced from the monitoring data aggregated in the monthly records. Through a cross check with the ETNs, verification team confirms the values of electricity supply is consistent with the ETNs and correct.

Table 2 Electricity supply to the grid (MWh)

Period	$EG_{j,y}$		
	Measured	ETNs	Conservative values
	A	B	C=MIN(A, B)
01/07/2017-31/07/2017	222,960.13	222,960.13	222,960.13
01/08/2017-31/08/2017	223,121.91	223,121.91	223,121.91
01/09/2017-30/09/2017	186,872.56	186,872.56	186,872.56
01/10/2017-31/10/2017	212,372.17	212,372.17	212,372.17
01/11/2017-30/11/2017	154,440.66	154,440.66	154,440.66
01/12/2017-31/12/2017	166,916.78	166,916.78	166,916.78
Subtotal 2017	1,166,684.21	1,166,684.21	1,166,684.21
01/01/2018-31/01/2018	192,948.34	192,948.34	192,948.34
01/02/2018-28/02/2018	192,894.03	192,894.03	192,894.03
01/03/2018-31/03/2018	224,816.05	224,816.05	224,816.05
01/04/2018-30/04/2018	217,966.91	217,966.91	217,966.91
01/05/2018-31/05/2018	242,895.63	242,895.63	242,895.63

Period	EG _{i,y}		
	Measured	ETNs	Conservative values
	A	B	C=MIN(A, B)
01/06/2018-30/06/2018	235,792.13	235,792.13	235,792.13
01/07/2018-31/07/2018	209,486.04	209,486.04	209,486.04
01/08/2018-31/08/2018	254,913.74	254,913.74	254,913.74
01/09/2018-30/09/2018	197,430.16	197,430.16	197,430.16
01/10/2018-31/10/2018	209,815.86	209,815.86	209,815.86
01/11/2018-30/11/2018	206,384.57	206,384.57	206,384.57
01/12/2018-31/12/2018	210,692.22	210,692.22	210,692.22
Subtotal 2018	2,596,035.65	2,596,035.65	2,596,035.65
01/01/2019-31/01/2019	198,394.67	198,394.67	198,394.67
01/02/2019-28/02/2019	151,211.81	151,211.81	151,211.81
01/03/2019-31/03/2019	182,357.91	182,357.91	182,357.91
01/04/2019-30/04/2019	195,400.36	195,400.36	195,400.36
01/05/2019-31/05/2019	248,144.91	248,144.91	248,144.91
01/06/2019-30/06/2019	210,803.92	210,803.92	210,803.92
01/07/2019-31/07/2019	235,381.18	235,381.18	235,381.18
01/08/2019-31/08/2019	236,388.05	236,388.05	236,388.05
01/09/2019-30/09/2019	185,050.84	185,050.84	185,050.84
01/10/2019-31/10/2019	199,455.83	199,455.83	199,455.83
01/11/2019-30/11/2019	186,386.43	186,386.43	186,386.43
01/12/2019-31/12/2019	177,095.82	177,095.82	177,095.82
Subtotal 2019	2,406,071.74	2,406,071.74	2,406,071.74
Total	6,168,791.59	6,168,791.59	6,168,791.59

Therefore, the baseline emission is calculated as:

year	f_{cap}	f_{wcm}	$EG_{j,y}$ (MWh)	EF_y (tCO _{2e} /MWh)	$BE_{Elec,y}$ (tCO _{2e})	$BE_{Ther,y}$ (tCO _{2e})	$BE_{flst,y}$ (tCO _{2e})	BE_y (tCO _{2e})
	A	B	C	D	$E=A*B*C*D$	F	G	$H=E+F+G$
01/07/2017-31/12/2017	1	1	1,166,684.21	0.6345	740,261	0	0	740,261
2018	1	1	2,596,035.65	0.6345	1,647,185	0	0	1,647,185
2019	1	1	2,406,071.74	0.6345	1,526,653	0	0	1,526,653
Total	1	1	6,168,791.59	0.6345	3,914,098	0	0	3,914,098

Project emissions

Project Emissions from LNG Consumed ($PE_{AF,y}$)

It is verified through the interview and by checking daily operation and maintenance records/20/, the project combusted LNG in small quantities with waste gases to make up caloric deficiencies or to warm boilers upon startup during this monitoring period. The quantity of LNG consumed by the Project ($AF_{i,j,y}$) in the MR and ER calculation was verified to be sourced from the daily reading records and aggregated monthly/8/, and was also cross checked with the invoices. It was verified the invoices were issued the total values for both the proposed project (1146) and the Phase I project (786). The verification team had checked records of each project against the invoices, and confirmed the consistency and correct of the monthly records used in the MR and ER calculation during this monitoring.

Table 3 LNG consumption

Period	AF _{I,j,y}				
	Measured Phase I project (786) (NM ³)	Measured The project (1146) (NM ³)	Sum of records (NM ³)	Invoice (NM ³)	Volume converted to mass of the proposed project (Gg)
	A	B	C=A+B	D	E=B*1000/22.4L/mol *16g/mol/10 ⁹
01/07/2017- 31/07/2017	68,000	2,771	70,771	70,771	0.0020
01/08/2017- 31/08/2017	49,975	2,000	51,975	51,975	0.0014
01/09/2017- 30/09/2017	17,526	2,000	19,526	19,526	0.0014
01/10/2017- 31/10/2017	44,229	5,372	49,601	49,601	0.0038
01/11/2017- 30/11/2017	438,106	47,692	485,798	485,798	0.0341
01/12/2017- 31/12/2017	90,204	31,191	121,395	121,395	0.0223
Subtotal 2017	708,040	91,026	799,066	799,066	0.0650
01/01/2018- 31/01/2018	432,078	162,180	594,258	594,258	0.1158
01/02/2018- 28/02/2018	121,285	120,173	241,458	241,458	0.0858
01/03/2018- 31/03/2018	5,525	142	5,667	5,667	0.0001
01/04/2018- 30/04/2018	30,576	1,865	32,441	32,441	0.0013
01/05/2018- 31/05/2018	19,427	12,639	32,066	32,066	0.0090
01/06/2018- 30/06/2018	12,973	19,747	32,720	32,720	0.0141
01/07/2018- 31/07/2018	2,847	-	2,847	2,847	0.0000
01/08/2018- 31/08/2018	1,286	-	1,286	1,286	0.0000

Period	AF _{I,j,y}				
	Measured Phase I project (786) (NM³)	Measured The project (1146) (NM³)	Sum of records (NM³)	Invoice (NM³)	Volume converted to mass of the proposed project (Gg)
	A	B	C=A+B	D	E=B*1000/22.4L/mol *16g/mol/10 ⁹
01/09/2018- 30/09/2018	766	-	766	766	0.0000
01/10/2018- 31/10/2018	11,214	5,453	16,667	16,667	0.0039
01/11/2018- 30/11/2018	6,045	162,466	168,511	168,511	0.1160
01/12/2018- 31/12/2018	41,484	10,372	51,856	51,856	0.0074
Subtotal 2018	685,506	495,037	1,180,543	1,180,543	0.3536
01/01/2019- 31/01/2019	8,644	77,800	86,444	86,444	0.0556
01/02/2019- 28/02/2019	4,726	89,801	94,527	94,527	0.0641
01/03/2019- 31/03/2019	2,486	22,377	24,863	24,863	0.0160
01/04/2019- 30/04/2019	7,065	6,266	13,331	13,331	0.0045
01/05/2019- 31/05/2019	-	44,449	44,449	44,449	0.0317
01/06/2019- 30/06/2019	-	27,311	27,311	27,311	0.0195
01/07/2019- 31/07/2019	-	5,176	5,176	5,176	0.0037
01/08/2019- 31/08/2019	-	11,921	11,921	11,921	0.0085
01/09/2019- 30/09/2019	5,351	3,875	9,226	9,226	0.0028
01/10/2019- 31/10/2019	3,061	3,900	6,961	6,961	0.0028

Period	AF _{i,j,y}				
	Measured Phase I project (786) (NM ³)	Measured The project (1146) (NM ³)	Sum of records (NM ³)	Invoice (NM ³)	Volume converted to mass of the proposed project (Gg)
	A	B	C=A+B	D	E=B*1000/22.4L/mol *16g/mol/10 ⁹
01/11/2019- 30/11/2019	26,100	26,228	52,328	52,328	0.0187
01/12/2019- 31/12/2019	-	246,811	246,811	246,811	0.1763
Subtotal 2019	57,433	565,915	623,348	623,348	0.4042
Total	1,450,979	1,151,978	2,602,957	2,602,957	0.8228

Project emissions from LNG consumption (PE_{AF,y}) was quantified by multiplying the total LNG consumption (AF_{i,j,y}) by the default values: NCV_i of LNG 50.4TJ/Gg and CO₂ emission factor(EF_{CO2,i,y}) for LNG 58,3000kgCO₂/TJ sourced from the current IPCC 2006 in the registered VCS PD/27/ in accordance to the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”:

$$PE_{AF,y} = AF_{i,j,y} \times NCV_i \times EF_{CO2,i,y}$$

Where:

AF_{i,j,y} LNG consumed on-site for power generation

NCV_i Net calorific value for fuel LNG

EF_{CO2,i,y} Carbon dioxide emissions factor for LNG

Therefore, the project emission due to LNG consumption is calculated as:

Year	AF _{i,j,y} (Gg)	NCV _i (TJ/Gg)	EF _{AF,i} (kgCO ₂ /TJ)	PE _{AF,y} (tCO ₂ e)
	A	B	C	D=A*B*C/1000
01/07/2017-31/12/2017	0.0650	50.4	58,3000	191
2018	0.3536	50.4	58,3000	1,039
2019	0.4042	50.4	58,3000	1,188
Total	0.8228	50.4	58,3000	2,418

Project Emissions from electricity consumed ($PE_{EL,y}$)

The quantity of project emissions from electric consumption ($PE_{EL,y}$) is determining in the calculation:

$$PE_{EL,y} = EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$$

Where:

$PE_{EL,y}$	Project emissions from electricity consumption in year y (tCO ₂ /yr)
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EL,j,y}$	Emission factor for electricity generation for source j in year y (tCO ₂ /MWh)
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y

As per the registered VCS PD, $EF_{EL,j,y}$ is the CO₂ emission factor for the grid (EF_y) 0.6345tCO₂e/MWh, and the average transmission and distribution loss factor ($TDL_{j,y}$) is 20%, both parameters are ex-anted in the registered VCS PD as per the applied methodology and tool.

The Project consumes grid-connected electricity for operating waste gas processing equipment. As mentioned in Section 3.3. above, the quantity of electricity consumed by the Project ($EC_{PJ,j,y}$) is calculated based on the rated capacity of the equipment as per the manufactures' specification with the assumption that the equipment is in full operation during the monitoring period.

Therefore, the amount of $EC_{PJ,y}$ for this monitoring period is accounted as follows:

$$EC_{PJ,y} \text{ per day: } (450kW \times 2 \text{ sets} \times 24\text{hrs/day} + 240kW \times 1 \text{ set} \times 24\text{hrs/day})/1,000$$

$$= 27.36 \text{ MWh}$$

Year	$EC_{PJ,j,y}$ per day (MWh)	Days	$EC_{PJ,j,y}$ (MWh)
	A	B	C=A*B
01/07/2017- 31/12/2017	27.36	184	5,034.24
2018	27.36	365	9,986.40
2019	27.36	365	9,986.40
Total	27.36	914	25,007.04

Therefore, the quantity of project emissions from electric consumption ($PE_{EL,y}$) during this monitoring period is:

Year	$EC_{PJ,y}$ (MWh)	$EF_{EL,y}$ (tCO ₂ e/MWh)	$TDL_{j,y}$	$PE_{EL,y}$ (tCO ₂ e)
	A	B	C	$D=A*B*(1+C)$
01/07/2017-31/12/2017	5,034.24	0.6345	20%	3,833
2018	9,986.40	0.6345	20%	7,604
2019	9,986.40	0.6345	20%	7,604
Total	25,007.04	0.6345	20%	19,040

In total, the project emissions during this monitoring period shown as below:

Year	$PE_{AF,y}$ (tCO ₂ e)	$PE_{EL,y}$ (tCO ₂ e)	PE_y (tCO ₂ e)
	A	B	$C=A+B$
01/07/2017-31/12/2017	191	3,833	4,024
2018	1,039	7,604	8,643
2019	1,188	7,604	8,792
Total	2,418	19,040	21,458

Leakages

Leakage does not need to be accounted for this project as per the applied methodology.

Emission reductions

The emission reductions for this monitoring period are calculated as:

Monitoring period	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)
01/07/2017- 31/12/2017	740,261	4,024	0	736,237
01/01/2018- 31/12/2018	1,647,185	8,643	0	1,638,542
01/01/2019- 31/12/2019	1,526,653	8,791	0	1,517,861
Total	3,914,098	21,458	0	3,892,640

4.5. Quality of Evidence to Determine GHG Emission Reductions and Removals

The assessment of each parameter related to calculate the GHG emission reductions is justified in Sections 4.1 and 4.4 above. Via the interview and desk review, the verification team verified the supporting evidence provided by the project proponent as listed in Appendix 3 used to determine the GHG emission reductions.

For each reported data, the evidence is provided and verified as sufficient and quality is appropriate. Also, the cross-checks have been performed on the reported data with different source of evidence. The information flow from data generation and aggregation, to recording, calculation and final transposition into the monitoring report has been assessed by VVB in Section 4.4. Moreover, the calibration is verified as stated in Section 4.1 via virtual interview and by checking evidences to confirm the meters' location, accuracy and calibration frequency are in line with requirement of the monitoring plan.

Therefore, it is concluded that the evidence provided are verified as sufficient and quality is appropriate and thus the evidence can be used to determine the GHG emission reductions and removals for this monitoring period.

4.6. Non-Permanence Risk Analysis

The project is not AFOLU project, and thus non-permanence risk analysis is not applicable for the project.

5. VERIFICATION CONCLUSION

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions that have been reported for the project activity "The Hyundai Waste Energy Co-generation Project Phase II " in China (VCS Project ID: 1146) for the period 01/07/2017-31/12/2019.

The verification is based on the baseline and monitoring methodology ACM0012 (version 4.0.0), registered VCS PD (version 3.6 dated 26/11/2014) and the monitoring report (version 02 dated 05/08/2022). The verification consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification and certification report.

The project proponents are responsible for the collection, calculation and determination of the GHG data in accordance with the monitoring plan and the reporting of GHG emission reductions on the basis set out within the project monitoring report.

Our verification approach was based on the requirements as defined under the applicable VCS Version 4 and relevant UNFCCC requirements. Our approach is risk-based, drawing on an understanding of the

risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is implemented and operated as per the registered VCS PD;
- the monitoring plan in registered VCS PD is as per the applied methodology;
- the monitoring complies with the monitoring plan in the registered VCS PD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS Standard 4.3 and CDM requirements;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

It is CTI's responsibility to provide an independent verification statement on the reported GHG emission reductions for the project. Based on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these, CTI planned and performed our work to obtain the information and explanations that we considered necessary to provide reasonable assurance that reported GHG emission reductions are fairly stated.

CTI does not assume any responsibility towards the issuance and utilization of the VCU's hereby verified and certified. Request for issuance of VCU's shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to CTI and the engagement conditions detailed in this report. CTI cannot be held liable by any party for decisions made or not made based on this report.

In CTI's opinion the GHG emissions reductions of the "The Hyundai Waste Energy Co-generation Project Phase II " for the period 01/07/2017-31/12/2019 are fairly stated in the monitoring report (version 02 dated 05/08/2022). The GHG emission reductions were calculated correctly on the basis of the approved methodology ACM0012 (version 4.0.0) and the monitoring plan contained in the registered VCS PD (version 3.6 dated 26/11/2014).

CTI can confirm that the GHG emission reductions are calculated without material misstatements. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, CTI confirms the following statement:

Reporting period: 01/07/2017-31/12/2019

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

Year	GHG emission reductions or removals (tCO ₂ e)
Year 2017 (01/07/2017- 31/12/2017)	736,237
Year 2018 (01/01/2018- 31/12/2018)	1,638,542
Year 2019 (01/01/2019- 31/12/2019)	1,517,861
Total ERs claimed (in 914 days)	3,892,640

Shunrong Lin

Ms. Lin Shunrong

Technical Leader

20/08/2022

Wu Lin

Mr. Lin Wu

Team Reviewer

20/08/2022

APPENDIX A: ABBREVIATIONS

BFG	Blast Furnace Gas
CAR	Corrective Action Request
CL	Clarification request
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
COG	Coke Oven Gas
CTI	Shenzhen CTI International Certification Co., Ltd
DOE	Designated Operational Entity
EF	Emission Factor
ER	Emission Reduction
EU ETS	EU Emissions Trading Scheme
ETNs	Electricity Transaction Notes
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
IREC	International Renewable Energy Certificates
LDG	Linz Donawitz Gas/converter Gas
MP	MONITORING REPORT
MR	Monitoring Report
KETS	Korean Emission Trading Scheme
KPX	Korea Power Exchange
PD	Project Description
PP	Project Proponent
SN	Serial Number
VCS	Verified Carbon Standard

VCU

Verified Carbon Unit

APPENDIX B: REFERENCES

5.1.1. Documentation used to verify the information provided by the project proponents

/1/	CERPD Inc.: VER/VCU Monitoring Report for The Hyundai Waste Energy Co-generation Project Phase II , version 01 dated 20/10/2021 and version 02 dated 05/08/2022
/2/	CERPD Inc.: Emission reduction calculation spreadsheet for The Hyundai Waste Energy Co-generation Project Phase II
/3/	Hyundai Green power CO., Ltd. and KPX.: Power Purchase Agreement for The Hyundai Waste Energy Co-generation Project Phase II
/4/	Hyundai Green power CO., Ltd. : Diagram of power connection system
/5/	Hyundai Green power CO., Ltd.: Diagram of project activity flow chart with monitoring points
/6/	Hyundai Green power CO., Ltd.: Daily reading and monthly aggregation records of the electricity supplied to the grid, 01/07/2017-31/12/2019
/7/	KPX.: ENTs, 01/07/2017-31/12/2019
/8/	Hyundai Green power CO., Ltd.: Daily reading record and monthly aggregation record of the LNG gas consumption, 01/07/2017-31/12/2019
/9/	NG supplier: Monthly Invoice of LNG consumption for the monitoring period
/10/	Hyundai Green power CO., Ltd.: LNG supply contract
/11/	Hyundai Green power CO., Ltd.: Energy consumption data statistics , 01/07/2017-31/12/2019
/12/	Hyundai Green power CO., Ltd.:Specifications of turbines and generators
/13/	Hyundai Green power CO., Ltd.: Specifications of rated power of COG fans
/14/	Hyundai Green power CO., Ltd.:Specifications of rated power of LDG fans
/15/	Korea Testing Certification(KTC): Calibration certificates of meters for monitoring electricity supply covering this monitoring period
/16/	Korea Mechanical, Electrical and Electronic Examination Institute: Qualification of calibration of Korea Testing Certification(KTC)
/17/	Korea Testing Certification(KTC): Confirmation letter of normal condition for the flow meters
/18/	KOGAS: Calibration of flow meters

/19/	Hyundai Green power CO., Ltd.: VCS monitoring manual and management procedure.
/20/	Hyundai Green power CO., Ltd.: Daily operation and maintenance records , 01/07/2017-31/12/2019
/21/	Shutdown records of EMS-IRTV system
/22/	Hyundai Green power CO., Ltd.: Records of training for on-site staff
/23/	Hyundai Green power CO., Ltd.: Project plan and actions for supporting undertakings in surrounding areas 2017, 2018, 2019
/24/	Hyundai Green power CO., Ltd.: Local stakeholders questionnaire surveys 2017, 2018, 2019
/25/	National Institute of Technology and Standards: Implementation rules of Metrology Law, 15/08/2021 Attachment 13 of Implementation rules of Metrology Law: Interval of calibration for meters Supply standard of LNG in Chungchongnam Province
/26/	First Environment, Inc.: VCS Validation report for The Hyundai Waste Energy Co-generation Project Phase II , version 1.1 dated 17/12/2014
/27/	CERPD Inc.: VCS PD for The Hyundai Waste Energy Co-generation Project Phase II , version 3.6 dated 26/11/2014
/28/	DNV Climate Change Services AS: 1 st verification report for The Hyundai Waste Energy Co-generation Project Phase II , Version 01, dated 20/11/2013
/29/	CERPD Inc.: VER/VCU Monitoring Report for The Hyundai Waste Energy Co-generation Project Phase II for 1 st monitoring period
/30/	Hyundai Green power CO., Ltd.: No double counting statement for the monitoring period 01/07/2017-31/12/2019, dated 20/10/2021
/31/	Hyundai Green power CO., Ltd.: Business license
/32/	Act on Allocation and Trading of Greenhouse Gas Emission Permits [Act No. 18469], issued by Ministry of Environment and Office of Government Policy Coordination, Republic of Korea
/33/	Guidelines on Allocation, Adjustment, and Revocation of Greenhouse Gas Emission Permits [Notice No. 2020-197], issued by Ministry of Trade, Industry and Energy, Republic of Korea
/34/	Guidance on external project feasibility assessment and reduction certification issued by Ministry of Trade, Industry and Energy, Ministry of Agriculture, Food and Rural Affairs, Ministry of Land, Infrastructure and Transport, Ministry of Environment and Ministry of Oceans and Fisheries
/35/	KOC registration platform https://ors.gir.go.kr/home/orap/openList.do?menuId=10

/36/	Letter of assurance for not being registered with another GHG program other than VCS signed by project proponents on 20/10/2021
/37/	Ministry of Employment and Labor: Official statistic of legal minimum wage in Korea www.minimumwage.go.kr/minWage/policy/decisionMain.do Hyundai Green power CO., Ltd.: Confirmation letter of hiring local residence, dated 24/08/2022
/38/	Hyundai Green power CO., Ltd.: Comparison of salary level against legal minimum wage, dated 24/08/2022
/39/	Verra approval for exemption from the on-site visit of the project activity, dated 01/12/2021

5.1.2. Methodologies, tools and other guidance

/40/	Verified Carbon Standard: VCS Standard, version 4.3
/41/	Verified Carbon Standard: VCS Program Guide, version 4.2
/42/	Verified Carbon Standard: VCS Program Definitions, version 4.2
/43/	Verified Carbon Standard: VCS Sectoral Scopes http://v-c-s.org/node/448
/44/	Verified Carbon Standard: Registration and Issuance Process, version 4.2
/45/	UNFCCC EB: Approved methodology, ACM0012, version 4.0.0
/46/	COVID-19 Travel Guidance for Projects, dated 18/03/2020

5.1.3. Persons interviewed

/47/	Mr. Sung Woo Seok, Team Leader of Energy Management of Hyundai Green power CO., Ltd. Mr. Jun Hyung Lee, Engineer of Hyundai Green power CO., Ltd. Mr. Young Hun Kim, Technician of Hyundai Green power CO., Ltd. Mr. Dong Kuk Kim, Senior Manager of Hyundai Steel Ms. Mi Ran Park, Manager of Hyundai Steel Mr. Jae Hyak Roh, Local resident Mr. Sung June Cho, Local resident Mr. Jong Bum Kim, Director of CERPD Inc.
------	---

	Mr. Jun Wang, Project Manager of CERPD Inc.
--	---

APPENDIX C: CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

5.1.4. Table 1: Corrective Action Requests

CAR ID	Corrective Action Request	Response by Project Proponent	Verification Team Assessment
CAR 1	The ER sheet lacks the crosscheck procedure to ensure the value of electricity supply to the grid applied in the MR and baseline emission calculation is correct and conservative.	The data of ETNs from power exchange has been added in ER sheet for crosscheck.	OK ENTs of electricity supply to the grid were provided in the ER spreadsheet for crosscheck. It was verified by the verification team the reading records are consistent with the values from the ENTs, and the baseline calculation are correct. Thus, CAR 1 was closed.
CAR 2	The ER sheet lacks the crosscheck procedure to ensure the value of LGN consumption applied in the MR and ER calculation is correct and conservative.	The data of invoice about LNG consumption has been added in ER sheet for crosscheck.	OK The invoices issued by the LNG supplier have been provided in the ER spreadsheet for crosscheck. It was verified in invoices were issued sum for both the project (786) and the Phase II project (1146). The verification team had checked records of each project against the invoices, and confirmed the consistency of the monthly records applied in the MR and ER calculation during this monitoring period. Thus, CAR 2 was closed.

5.1.5. Table 2: Clarification Requests

CL ID	Clarification Request	Response by Project Proponent	Verification Team Assessment
CL 1	As a remote inspection verification, the technology applied by the project i.e., main equipment including the technical specifications (type/model, capacity), and implementation flow chart is requested to be described in Section 3.1 of the MR.	Has been updated in MR	OK Section 3,1 of the revised MR provides the information as required. It was verified by checking the technical specifications and nameplates of the facilities the information provided in the revised MR are correct and in line with the registered VCS PD. Thus, CL 1 was closed.
CL 2	The diagram showing the location of monitoring equipment and monitoring points is requested to be provided in Section 4.3 of the MR.	Has been updated in MR	OK By the checking the revised MR, the verification team confirmed diagram to show the monitoring locations was provided and correctly presented. Thus, CL 2 was closed.
CL 3	Calibration and valid dates of monitoring meters for EG _{j,y} are not completed, please specify the dates in Section 4.2 of the MR.	Has been updated in MR	OK Dates of calibration and validity of the meters for monitoring EG _{j,y} are provided in Section 4.2 of the revised MR. All information presented are confirmed to be correct via checking the calibration certificates. Thus, CL 3 was closed.

CL ID	Clarification Request	Response by Project Proponent	Verification Team Assessment
CL 4	In section 4.2 of the MR, it is not clear whether the flow meters for monitoring LNG consumption were under normal condition during the proposed monitoring period, please clarify that with evidence.	Evidence of LNG meter in Normal condition has been provided by project owner	OK Via the interview and through checking the operation and maintenance records, and confirmation letter of normal condition for LNG flow meters, it was confirmed the meters were under normal operation with during this monitoring period. Thus, CL 4 was closed.
CL 5	The description of ongoing communication with local stakeholders during this monitoring period was not provided in Section 2.2 of the MR, thus a clarification is raised according to the instruction of the MR template.	Has been updated in MR with evidences.	OK Section 2.2 of the revised MR supplements the information regarding the ongoing communication with local stakeholders during this monitoring period. The verification team confirmed the description via the interview and checking the questionnaire survey on 11/05/2017, 05/09/2017, 14/12/2018 and 04/11/2019 to collect feedback and comments from stakeholders. The ongoing communication mechanism was well set up and carried out at the periodic intervals by the project proponent during this monitoring period, and no negative comments nor grievance received. Thus, CL 5 was closed.

5.1.6. Table 3: Forward Action Requests

FAR ID	Forward Action Request	Response by Project Proponent	Verification Team Assessment
NA	NA	NA	NA