VERIFICATION REPORT FOR HYUNDAI STEEL WASTE ENERGY COGENERATION PROJECT

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Project Title	Hyundai Steel Waste Energy Cogeneration Project https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=2&i=786&lat=36%2E982852&lon=126%2E70322&bp=1
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Summary:

Perry Johnson Registrars Carbon Emissions Services, INC (PJRCES) performed the 2nd periodic verification of the emission reductions for VCS (Verified Carbon Standard) project titled "Hyundai Steel Waste Energy Cogeneration Project" (Project I.D. 786) during the selected monitoring period from 01 January 2012 to 31 May 2013.

The Project has been validated by First Environment, Inc. based on the VCS PD Version 4, 2 dated 4 January 2012 and reported in the validation report version 1 dated 9 February 2012. The Project was registered as a VCS project activity on 01 March 2012 under approved CDM *ACM0012 version 4.0.0* "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects".

An off-site desk review and an on-site visit have been conducted to verify the data submitted in the monitoring report. PJRCES verified the asserted emission reductions against the approved consolidated baseline methodology *ACM0012 version 4.0.0* "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects", on the basis of the VCS Validation and Verification Manual, V3.1, 08 October 2013 /26/, also in compliance with Clean Development Mechanism Validation and Verification Standard, Version 05.0 /27/, as well as criteria given to provide for consistent project operations, monitoring and reporting.

Based on the assessment, PJRCES confirms that the Project is implemented as planned and described in the validated VCS PD. The monitoring plan is in compliance with the applied methodology *ACM0012 version 4.0.0* "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" and the actual monitoring has been carried out in accordance with the monitoring plan in the validated VCS PD. The monitoring system is in place and the emission reductions are calculated without material misstatements. PJRCES is able to certify that the implementation of the project has resulted in GHG emission reductions of 2,791,556 tCO_2 equivalent during the monitoring period from 01 January 2012 to 31 May 2013.

PJRCES's opinion regarding the reported emission reductions for the given monitoring period is based on the information sought and also review of publicly available information where applicable. ISO-14064 guidelines have been applied in principle to assess the key issues like accuracy, completeness and conservativeness of the information. PJRCES's verification/certification of GHG emissions is limited to this information evaluation.

Issuance and utilization of certified GHG-emission reductions is beyond the scope of PJRCES.

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1 INTRODUCTION

1.1 Objective

CERPD, Inc. has commissioned PJRCES, Inc to perform the 2nd VCS verification of greenhouse gas (GHG) emission reductions of the project activity "Hyundai Steel Waste Energy Cogeneration Project" (hereafter referred to as "the Project") for the period from 01 January 2012 to 31 May 2013.

PJRCES, as the validation/verification body (VVB) of the Project, has been accredited as a DOE by UNFCCC and also meets the competence requirements as set out in the ISO 14065:2007.

The verification under VCS Standard, Version 3.4, 08 October 2013 /24/ is the independent *ex-post* quantification and certification of the GHG emission reductions achieved by a project activity which has completed validation under VCS v3 or validated under a VCS approved GHG program.

The objective of this verification is to verify the reported voluntary emission reductions generated by the Project for the period from 01 January 2012 to 31 May 2013 and to confirm that actual monitoring systems and procedures are in compliance with that described in the monitoring plan and the additional requirements stated by the VCS Association (VCSA).

The above work is carried out through an independent assessment and a written assurance is provided on the GHG emission reductions achieved for the period specified.

1.2 Scope and Criteria

The scope of the verification covers independent objective review and *ex-post* determination of the monitored GHG emission reductions by the project activity "Hyundai Steel Waste Energy Cogeneration Project".

The specific scope of the verification work involves:

- To verify that the project activity is implemented as per the project details of the validated project design document (PD) or the VCS PD.
- To assess whether the emissions reductions determined are in conformance with the monitoring plan of the VCS PD and the approved methodology.
- To express a conclusion whether reported data are accurate, complete, consistent, and transparent with a reasonable level of assurance and free of omission or material error, based on the review of the reported data and emission reduction calculations.

The approach adopted by PJRCES verification team is risk-based, drawing on an understanding of the risks associated with reporting of GHG emissions data and the controls in place to mitigate these. Definition of materiality is: 1) Any misstatement greater than 1% of the Project's GHG assertion and 2) qualitative non-comformities with VCS Standard, Version 3.4, 08 October 2013 requirements. Qualitative non-conformities with the VCS Standard, the CDM methodology ACM0012 version 4.0.0 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects", and the validated PD are also considered material during the verification process.

The request for issuance of Verified Carbon Units (VCUs), verified and certified by PJRCES, shall be made by the project proponent to the VCS registry in accordance with the most recent version of the VCS Program Guide /25/, VCS Project Registration & Issuance Process. In view of the above, PJRCES's responsibility is limited only to verification and certification of the GHG emission reductions achieved during the specified period.

1.3 Level of assurance

In line with VCS Standard, Version 3.4, 08 October 2013 requirements and as per ISO 14064-3:2006 paragraph A.2.3.2, a "reasonable level of assurance" is defined for the verification of the project.

This implies that, based on the process and procedures conducted, PJRCES confirms that the GHG assertion in the monitoring report:

- is materially correct and is a fair representation of the GHG data and information, and
- is prepared in accordance with VCS requirements, the validated PD and the approved methodology for information pertaining to GHG quantification, monitoring and reporting.

PJRCES has carried out the verification work as per this requirement and has prepared this report to a reasonable level of assurance with a maximum allowable materiality threshold of 1% as outlined in Section 5.3.1 of the VCS Standard, Version 3.4, 08 October 2013.

1.4 Summary Description of the Project

Title of the Project Activity	Hyundai Steel Waste Energy Cogeneration Project
Location of the project activity	Donggok-ri Songsan-myeon Dangjin-gun Chungchongnam-do, Republic of Korea
Commercial Operation Date	24 March 2010
Project Participants	Hyundai Green power CO., Ltd from Republic of Korea; CERPD Inc. from USA.
Baseline and Monitoring methodology:	"Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" ACM0012 version 4.0.0
VCS Project I.D	786
Project's crediting period	24 March 2010 to 23 March 2020 (fixed 10 years)
Annual estimated emission reduction, in registered PD	1,774,699 t CO_2e
Verification Period covered in this Report	01 January 2012 to 31 May 2013 (2nd Monitoring period)
Emission reduction for this monitoring period	**2,791,556** t CO_2e

The Hyundai Steel Waste Energy Recovery Co-generation Project is a 400MW cogeneration plant at Hyundai Steel, which is developed by Hyundai Green power CO., Ltd. The project utilizes surplus waste gases sourced from two newly built blast furnace (BF) including LDG (Blast Furnace Gas), COG (Coke Oven Gas) and LDG (Linz Donawitz Gas/converter Gas) produced by Dangjin Hyundai Steel Mill to generate electricity. The waste gases created by Dangjin Hyundai Steel Mill are re-used by the steel mill and the rest (balance) are combusted in the boilers by the proposed project to produce steam, which is returned to Hyundai Steel for use in industrial applications or used to produce electricity exported to national transmission grid. Through this project, approximately 2,741,035MWh electricity will be sent to power grid, and 1,285,000 ton steam will be produced and sent to Steel. And the emission reductions are estimated to be 1,774,699 tCO_2e per year.

Without the proposed project, the rest of waste gases are emitted to atmosphere after incineration, the electricity generated by the proposed project will be supplied by grid.

The Project is owned by Hyundai Green power CO., Ltd (hereafter referred to as "the PP"), and is located in Donggok-ri Songsan-myeon Dangjin-gun Chungchongnam-do, Republic of Korea. The geodetic coordinates are 126° 42'11.60" E, 36°58'58.27" N.

The Project has been validated by First Environment, Inc. based on the VCS Project Description (VCS PD) Version 4, 2 dated 4 January 2012 /22/ and reported in the validation report version 1 dated 9 February 2012 /21/. The Project was registered as a VCS project activity on 01 March 2012 (Project I.D. 786) under approved CDM methodology *ACM0012 version 4.0.0 "*Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects*"*.

The VCS Project start date is 24 March 2010 on which the commissioning of power plant was commissioned /16/ and the Project began generating GHG emission reductions. The monitoring period for the Project under the VCS is from 01 January 2012 to 31 May 2013 which is within the VCS crediting period, i.e. 24 March 2010 to 23 March 2020.

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

Not applicable

2.2 Validation Findings

Not applicable

2.2.1 Gap Validation

Not applicable

2.2.2 Methodology Deviations

Not applicable

2.2.3 Project Description Deviations

Not applicable

2.2.4 New Project Activity Instances

Not applicable

2.2.5 Validation Conclusion

Not applicable

3 VERIFICATION PROCESS

3.1 Method and Criteria

The Project verification process is based on the VCS Standard, Version 3.4, 08 October 2013 /24/ and is conducted using standard auditing techniques to assess the correctness of the information provided by the project participants.

For verification of emission reductions, PJRCES's approach involves broadly three steps:

a) Completeness check and desktop review of the monitoring report;

b) Onsite inspection and issuance of findings from the audit;

c) Resolution of the findings and preparation of the verification report.

The prepared report and other supporting documents underwent an internal quality control before being deliverable to the client.

The following team members from PJRCES were involved in these steps:

Name	Role	Areas covered
Zhang Xiaojun Johnsen	Team Leader/Validator	Supervision of "Desktop review, site visit, interviewing project representatives, issuance and closure of findings, final report and certification preparation."
Wu Jianmin	Team Member	Expert inputs on the project activities
Anjana Sharma	Independent Technical Reviewer	Technical review

3.2 Document Review

On receipt of the Monitoring Report /1/ from the client, the completeness of information made available as per VCS Standard, Version 3.4, 08 October 2013 requirements was reviewed.

A desktop review was further carried out to assess the following:

a) The validated VCS PD Version 4, 2 dated 4 January 2012 /22/ with the monitoring plan;

b) The VCS Monitoring Report version 2 dated 10 December 2013 /1/;

c) The emission reduction calculation spreadsheet /2/.

d) The VCS validation report version 1 dated 9 February 2012 /21/.

A complete list of all documents reviewed is attached in Appendix I of this report.

3.3 Interviews

On 28 November 2013 to 29 November 2013, PJRCES performed an on-site visit and interviewed with project stakeholders to confirm selected information and to resolve issues identified in the document review. Prior to that, PJRCES has checked and confirmed that the Project has been listed on the project pipeline dated 24 March 2010 in the VCS project database.

Interviewed personnel	Organization	Interview topics
Choi Seung Yeoul (Team leader) Dong-Kuk Kim (Assistant manager) Hyungik Min (Energy planning team)	Hyundai Green power CO., Ltd (Project Owner) Hyundai Steel	• Project Design and implementation • Technical equipment, calibration and operation • Monitoring Plan and management procedures • Monitoring data • Data uncertainty and residual risks (QA/QC) • Environmental Impacts • Energy balance in the Hyundai Steel • Compliance with National Laws and Regulations
Wang Jun Jongbum Kim	CERPD Inc. (Consultant)	• Monitoring Plan • Monitored data and Monitoring Report • GHG Calculations

3.4 Site Inspections

The interviewed personnel are listed in the Table in section 3.3 of the report.

PJRCES carried out the site visit from 28 November 2013 to 29 November 2013, upon the Hyundai Steel Waste Energy Cogeneration Project located at Donggok-ri Songsan-myeon Dangjin-gun Chungchongnam-do, Republic of Korea. The details of the personnel interviewed in the site visit have been detailed in section 3.3 above. During the site visit, PJRCES verified the following:

a) Visual inspection on key physical components and configuration of the operation and monitoring system;

b) Physical inspection of the control room, instrument room, step-up station;

c) Implementation status of the project /16/, training plan and staff training records /15/;

d) Production log /3/ /4/, including daily operation and maintenance record /14/

e) Rated capacity of fans /5/ /6/ and energy consumption statistics /7/;

f) Information processes for generating, aggregating and reporting the selected monitored parameters, including, but not limited to production log books /3/ /4/ for electricity generation and LNG consumption;

g) Invoice cross-check information /8/ /9/;

h) Review of the calibration certificates /11/ /12/ with the validity for the current monitoring period, the accuracy of the meters;

i) Assumption adopted and calculation of the project emission, baseline emission and leakage /2/;

j) QA/QC procedures /10/.

3.5 Resolution of Any Material Discrepancy

Based on the site inspection and review of documents & records, issues that needed correction, further elaboration, researched or added in order that the project activity meets the VCS Standard, Version 3.4, 08 October 2013 and can achieve credible emission reductions were identified.

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

A Corrective Action Request (CAR) is raised, if one of the following situations occurs:

a) Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;

c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

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

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

To guarantee the transparency of the verification process, the concerns raised are documented with more details in Appendix II of this report.

4 VERIFICATION FINDINGS

4.1 Post Registration Changes

Through the document review and the onsite visit, the assessment team confirms that the project was implemented according to the registered monitoring plan and applied methodology. Only minor changes in the monitoring and measurement section from registered PD, Version 4, 2 dated 4 January 2012 /22/ were observed, which are reflected in section 4.1.3.

4.1.1. Temporary deviations from registered monitoring plan or applied methodology

There was no temporary deviations from the project activity as described in registered PD, Version 4, 2 dated 4 January 2012 /22/.

4.1.2. Corrections

There were no corrections to the project information.

4.1.3. Permanent changes from registered monitoring plan or applied methodology

The following changes are identified in the real circumstances of operation.

Table 1 Permanent changes

Parameter	Monitoring Requirement from VCS PD	Actual situation of the project implementation	Justification and Verification Conclusion
$EG_{PJ,y}$	Measurement records of electricity consumption by the Project recorded monthly.	Two electric fans for COG (Coke Oven Gas) and one fan for LDG (Linz—Donawitz Process Gas) are used without metering. Electricity consumption by the Project is estimated based on electric ratings of those fans.	Electricity consumption from these fans has been accounted for as project emissions. In this monitoring report, the amount of electricity consumption of booster fans (2 fans each with rated capacity of 450kW /7/ for COG; 1 fan with rated capacity of 240kW /6/ for LDG) was calculated with the default value of manufacture's specification with the assumption of full operation for the monitoring period. Using the fans rated power capacity and assumed round-clock operation will account maximum electricity consumption, then leading to more conservative value those results in the lower overall emission reductions of the project activity.

4.1.4. Changes to project design of registered project activity

There were no changes to the project design of the registered project activity in this monitoring period.

4.1.5. Changes to start date of crediting period

The start date of the crediting period has been not changed.

4.2 Remaining Issues, CARs, FARs from Previous Validation or Verification

There are no remaining issues from the previous validation /21/ and previous verification /23/. Further, deviations identified in the 1st verification process for the Project are minor and resolved in satisfactory way, in line with GHG principles and the ACM0012 methodology.

4.3 Project Implementation Status

[General]

The project is a newly built waste energy recovery Co-generation power plant, located in Donggok-ri Songsan-myeon Dangjin-gun Chungchongnam-do, Republic of Korea. Based on the site visit, the verification team confirms that all physical features of the Project presented in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/ are in place and the PP has operated the Project as per the registered VCS PD Version 4, 2 dated 4 January 2012 /22/.

Project was put into commercial operation from 24 March 2010 /16/, which was confirmed against the daily operation and maintenance record for power plant /14/ by the verification team. All the components of the project activity were in place and well operated, and no change to the project design was observed during the site visit. The operation and maintenance records for the power plant have been provided during site visit /14/. No special event which would affect the monitoring of the project was observed during the given monitoring period.

[Generation system, verified against the registered PD]

PJRCES has performed an on-site visit to verify the real implementation of the Project against the description in its registered VCS PD Version 4, 2 dated 4 January 2012 /22/, and verified that Hyundai Steel Waste Energy Recovery Co-generation Project is a 400MW cogeneration plant at Hyundai Steel, which is developed by Hyundai Green power CO., Ltd. The project utilizes surplus waste gases sourced from two newly built blast furnace (BF) including LDG (Blast Furnace Gas), COG (Coke Oven Gas) and LDG (Linz Donawitz Gas/converter Gas) produced by Dangjin Hyundai Steel Mill to generate electricity. The waste gases created by Dangjin Hyundai Steel Mill are re-used by the steel mill and the rest (balance) are combusted in the boilers by the proposed project to produce steam, which is returned to Hyundai Steel for use in industrial applications or used to produce electricity exported to national transmission *grid.*

It was verified during the on-site visit that cogeneration power plant were commercially comissioned on 24 March 2010. Through physical onsite visit, it was confirmed that the gas supply system, turbine and generator, auxilliary equipment, which is in place with the same specifications viz the registered VCS PD Version 4, 2 dated 4 January 2012 /22/. The total installed capacity is 400MW and the electricity generated is transmitted to the Grid. Therefore, it was verified that the project has been implemented and operated as per the registered VCS PD Version 4, 2 dated 4 January 2012 /22/.

The project boundary is consistent with that in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/. As per the registered VCS PD Version 4, 2 dated 4 January 2012 /22/ and VCS validation report version 1 dated 9 February 2012 /21/, there are no other sources of GHG emissions attributable to the project activity. LNF gas was used for startup of power engines /4/ /9/ by the project during this monitoring period as verified through onsite visit and interview with the project owner.

[Metering system, verified against the registered PD]

The primary parameter monitored and reported is the quantity of electricity generated and exported to the grid, using four standard meters, back-up by another four meters.

The second parameter monitored is quantity of LNG consumed by the Project using two standard flow meters.

Onsite metering equipment as per registered VCS PD Version 4, 2 dated 4 January 2012 /22/ have been found in place.

[Operation and maintenance of the current monitoring period]

The project was in normal operation as reflected in MR version 2 dated 10 December 2013. It was confirmed that startup of engines consumes LNG before the engines completely combusts the COG/BFG/LDG waste gases /4/. Nevertheless, there are no events or situations /14/ that occurred during this monitoring period which may impact the applicability of the methodology ACM0012 version 4.0.0.

[Management and QA/QC]

Management and operational system is in place. QA/QC procedures stipulated in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/ have been followed /10/. Emergency plan was in place /13/. The staffs were well trained and qualified /15/. During the site visit, PJRCES was able to confirm that data collection and management system were in place and it is effective.

All required equipment and procedures are available and implemented in an appropriate manner. All necessary monitoring instruments are installed. All required instruments including standby and operating procedures for the same have been implemented in an appropriate manner.

4.4 Accuracy of GHG Emission Reduction or Removal Calculations

4.4.1. Electricity exported

The quantity of electricity generated by the Project and supplied to the grid is monitored continuously by electricity meters.

<table>
<tr><td>Data / Parameter</td><td>$EG_{j,y}$</td></tr>
<tr><td>Data unit</td><td>MWh</td></tr>
<tr><td>Description</td><td>Quantity of electricity supplied to the grid by the project activity during the year y.</td></tr>
<tr><td>Measured /Calculated /Default:</td><td>Measured</td></tr>
<tr><td>Measurement Frequency</td><td>Continuously measured and daily recorded</td></tr>
<tr><td>QA/QC Procedures Applied, including calibration</td><td>Cross check measurement results with KPX invoices which were aggregated monthly and annually. QA/QC procedures conducted on site was verified via review of following documents:
Daily reading record and monthly aggregation record /3/
Electricity sale invoices for the electricity delivered to the grid /8/
Calibration Reports for the electricity meters /11/
CDM Monitoring Management Manual /10/
CDM Training /15/</td></tr>
<tr><td>Verification Observations/Assessment</td><td>The quantity of electricity generated by the Project and supplied to the grid is monitored continuously by eight meters. Data recorded by the meters are aggregated daily /3/ and reported to the grid operator, Korea Power Exchange (KPX). KPX invoices /8/ were used for the purposes of cross-check. The invoice is commercial evidence for billing and it can provide the reliable basis for cross-checking the electricity delivered to grid. Moreover the invoice provider is Korea Power Exchange (KPX), the grid operator, who is authority for this service.
The accuracy and calibration of the meters are shown as the following.

<table>
<tr><td colspan="3">Table 2 Main meter 1</td></tr>
<tr><td>Type</td><td colspan="2">3P4W110V5A</td></tr>
<tr><td>SN</td><td colspan="2">PT-0808A177-01</td></tr>
<tr><td>Accuracy</td><td colspan="2">0.2s</td></tr>
<tr><td>Calibration date</td><td>30/10/2009</td><td>12/12/2012</td></tr>
<tr><td>Validity</td><td>3.5 years</td><td>3.5 years</td></tr>
<tr><td>Calibrated by</td><td colspan="2">Korea Power Exchange (KPX)</td></tr>
</table>
</td></tr>
</table>

Table 3 Main meter 2		
Type	3P4W110V5A	
SN	PT-0808A717-01	
Accuracy	0.2s	
Calibration date	30/10/2009	12/12/2012
Validity	3.5 years	3.5 years
Calibrated by	Korea Power Exchange (KPX)	

Table 4 Main meter 3		
Type	3P4W110V5A	
SN	PT-0808A176-01	
Accuracy	0.2s	
Calibration date	15/07/2010	12/12/2012
Validity	3.5 years	3.5 years
Calibrated by	Korea Power Exchange (KPX)	

Table 5 Main meter 4		
Type	3P4W110V5A	
SN	PT-0808A178-01	
Accuracy	0.2s	
Calibration date	15/07/2010	12/12/2012
Validity	3.5 years	3.5 years
Calibrated by	Korea Power Exchange (KPX)	

Table 6 Main meter 5		
Type	3P4W110V5A	
SN	51001402	
Accuracy	0.5s	
Calibration date	30/10/2009	12/12/2012
Validity	3.5 years	3.5 years
Calibrated by	Korea Power Exchange (KPX)	

Table 7 Main meter 6		
Type	3P4W110V5A	
SN	51001399	
Accuracy	0.5s	
Calibration date	30/10/2009	12/12/2012

	Validity	3.5 years	3.5 years
	Calibrated by	Korea Power Exchange (KPX)	

Table 8 Main meter 7		
Type	3P4W110V5A	
SN	51001400	
Accuracy	0.5s	
Calibration date	15/07/2010	12/12/2012
Validity	3.5 years	3.5 years
Calibrated by	Korea Power Exchange (KPX)	

Table 9 Main meter 8		
Type	3P4W110V5A	
SN	51001398	
Accuracy	0.5s	
Calibration date	15/07/2010	12/12/2012
Validity	3.5 years	3.5 years
Calibrated by	Korea Power Exchange (KPX)	

PJRCES reviewed records of the calibration events for the current monitoring period for all eight meters used to record electricity generation data. The records indicated that the meters were operating accurately.

Conclusions	• The monitoring results have been recorded consistently as per the approved frequency in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/. • QA/QC procedures have been applied in accordance with the in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/.

4.4.2. Electricity Consumed

The quantity of electricity consumed by the Project for process of waste gas is calculated result, instead of originally measured one as stipulated in registered VCS PD.

Data / Parameter	$EC_{PJ,y}$
Data unit	MWh
Description	Quantity of electricity consumed by the project electricity consumption source j in year y.
Measured /Calculated /Default:	As noted in Section 4.1 (Deviation), the quantity of electricity consumed by the Project ($EC_{PJ,y}$) was calculated based on the equipment rating specified by the manufacturer, and the conservative assumption is that the equipment was in continuous operation during the entire verification period.
Measurement Frequency	/

QA/QC Procedures Applied, including calibration	As per the registered VCS PD Version 4, 2 dated 4 January 2012 /22/, this parameter was obtained from Measurement records of electricity consumption by the Project recorded monthly. While actually the conservative approach was sought, calculated based on the equipment rating specified by the manufacturer, and the conservative assumption that the equipment was in continuous operation during the entire verification period is deemed proper by verification team. QA/QC procedures conducted on site was verified via review of following documents: • Rated capacity for LDG fans /6/ • Rated capacity for COG fans /7/ • Energy consumption data statistics /5/ • CDM Monitoring Management Manual /10/
Verification Observations/Assessment	Electricity consumption by the Project is estimated based on electric ratings of Project equipment. The following is the rated capacity of the fans: 1) No fan for BFG, as the BFG gas has pressure of 800-1000 mm Hg; 2) 2 set of fans (450 kW) in operation with one fan (450 kW) stand-by for COG gas, with gas pressure of 400-600 mm Hg; 3) 1 set of fan (240 kW) in operation with one fan (240 kW) stand-by for LDG gas, with gas pressure of 400-600 mm Hg.
Conclusions	This option uses the maximum electricity consumption, entailing more electricity consumption than actual measurement. It is in the end resulting less emission reductions accounting.

4.4.3. LNG consumed

The quantity of LNG consumed by the Project is monitored using four revenue grade meters.

Data / Parameter	$AF_{i,j,y}$
Data unit	M^3
Description	LNG consumed on-site for power generation. Co-fires LNG in small quantities with waste gas to make up caloric deficiencies or to warm boilers upon startup.
Measured /Calculated /Default:	Measured
Measurement Frequency	Continuously measured, daily recorded and monthly reported
QA/QC Procedures Applied, including calibration	Invoice for buying the LNG was used for cross-checking total LNG consumed. QA/QC procedures conducted on site was verified via review of following documents: • Daily reading record and monthly aggregation record /4/; • Monthly invoice of LNG consumption /9/; • CDM Monitoring Management Manual /10/; • CDM Training /15/
Verification Observations/Assessment	Flow meters are used to record the LNG consumed. Data are recorded daily and monthly aggregated. The flow meters are calibrated upon abnormal operation.

<table>
<tr><td></td><td>The relevant information of flow meters has been shown in the Table 10 below:
<table>
<tr><td>Tag No.</td><td>FQIT-01</td><td>FQIT-02</td></tr>
<tr><td>Model</td><td>SM-RI-X</td><td>SM-RI-X</td></tr>
<tr><td>Flow rate</td><td>773~24,477 Nm^3/h</td><td>773~24,477 Nm^3/h</td></tr>
<tr><td>Accuracy</td><td>±1.0%</td><td>±1.0%</td></tr>
<tr><td>Type</td><td>Oil pump type</td><td>Oil pump type</td></tr>
<tr><td>Calibration entity</td><td colspan="2">Korean Testing Certification Research Institute</td></tr>
</table></td></tr>
<tr><td>Conclusions</td><td>PJRCES confirmed that:
The equipment for monitoring has an appropriate accuracy and has been controlled in accordance with the registered VCS PD Version 4, 2 dated 4 January 2012 /22/.
The monitoring results have been recorded consistently as per the approved frequency in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/.
QA/QC procedures have been applied in accordance with the registered VCS PD Version 4, 2 dated 4 January 2012 /22/.</td></tr>
</table>

The monitoring has been carried out (not for $EC_{PJ,y}$; but justification is acceptable) in accordance with the monitoring plan contained in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/. All parameters (not for $EC_{PJ,y}$; but justification is acceptable) were monitored and determined as per the monitoring plan.

4.5 GHG Emission Reduction Calculations

According to the applied methodology ACM0012 version 4.0.0 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects", the emission reductions during the monitoring period are determined as the difference between baseline emissions, project emissions and leakage:

$$ER_y = BE_y - PE_y - L_y$$

4.5.1. Capping factors

In accordance with Annex 3 of ACM0012 version 4.0.0 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" as well as the validated 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 (Hyundai Steel Mill) compared to a baseline. The baseline utilization for the production facility was previously validated and fixed at 45.7 percent.

Energy utilization data for this purpose are monitored continuously, aggregated daily and monthly, and compiled into a monthly report /5/. A facility operator and a manager both authenticate the monthly reports.

Table 11 Yearly report of energy utilization data

The actual energy balance in 2012			
Waste Gas	For Hyundai Green power	For alternative uses (Hyundai Steel)	Total
	Percentage	Percentage	Percentage
COG	23.7%	76.3%	100%
BFG	55.3%	44.7%	100%
LDG	30.9%	69.1%	100%
Total	42.6%	57.4%	100%

The actual energy balance in 2013			
Waste Gas	For Hyundai Green power	For alternative uses (Hyundai Steel)	Total
	Percentage	Percentage	Percentage
COG	24.2%	75.8%	100%
BFG	56.2%	43.8%	100%
LDG	46.6%	53.4%	100%
Total	44.5%	55.5%	100%

PJRCES reviewed these monthly reports /5/ as evidence of waste gas utilization by the Project and the production facility, and confirmed that the annual waste gas utilization by the production facility was greater than 45.7 percent, meaning that project implementation did not decrease the internal utilization of waste gas relative to the ratio confirmed at validation, thereby conforming to the requirement.

4.5.2. Baseline Emissions

The project has no fossil fuel used for flaring the waste gas in the baseline, thus $BE_{flst,y}$ =0.

The proposed project doesn't claim GHG emission reductions from thermal energy for conservativeness.

The baseline emission calculation is indicated as the following:

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

Where:

$\mathbf{BE_y}$	The total baseline emissions during the year *y* in tCO_2.
$\mathbf{BE_{En,y}}$	The baseline emissions from energy generated by the project activity during the year *y* in tCO_2.
$\mathbf{BE_{flst,y}}$	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 (tCO_2).
$\mathbf{BE_{Elec,y}}$	Baseline emissions from electricity during the year *y* in tCO_2.
$\mathbf{BE_{Ther,y}}$	Baseline emissions from thermal energy (due to heat generation by elemental processes) during the year *y* (tCO_2).

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

Where:

$\mathbf{BE_{elec,y}}$	Baseline emissions due to displacement of electricity during the year *y* (tCO_2)
$\mathbf{EG_{i,j,y}}$	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.
$\mathbf{EF_{elec,i,j,y}}$	The CO_2 emission factor for the electricity source *i* (gr for the grid), displaced due to the project activity, during the year *y* (tCO_2/MWh).
$\mathbf{f_{wcm}}$	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.
$\mathbf{f_{cap}}$	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.

For $\mathbf{f_{wcm}}$ of the project, it is 1 as the electricity generation is purely from use of waste energy.
As the project is a Greenfield power plant, f_{cap} of this project is 1.

Baseline emissions: The total electricity generated during the verification period was multiplied by the Combined Margin CO_2 emission factor for the grid electricity displaced due to project activity (EF_y), which

had been previously calculated ex-ante and approved during validation. The Combined Margin value of 0.6441 tCO_2 / MWh applied in calculations is consistent with the validated VCS PD /22/.

$$BE_y = f_{cap} \times f_{WCM} \times EG_{i,j,y} \times EF_y$$

$\boldsymbol{EG_{i,j,y}}$	Quantity of electricity supplied by the project to the grid (MWh)
EF_y	Combined Margin CO_2 emission factor for the grid electricity displaced due to project activity which had been previously calculated ex-ante and approved during validation.

It has been verified that the electricity exported to the grid is 4, 239,263MWh.

The electricity exported by the Project to the grid in this reporting period is shown in the following Table 12.

Table 12 Electricity exported to the grid by the Project (MWh)

Period	Electricity exports to the grid used for ER calculation
01/01-31/01/2012	259,885.51
01/02-30/02/2012	253,489.02
01/03-31/03/2012	273,658.17
01/04-29/04/2012	261,903.45
01/05-31/05/2012	217,689.86
01/06-30/06/2012	223,845.88
01/07-31/07/2012	265,966.95
01/08-31/08/2012	274,630.64
01/09-30/09/2012	258,864.80
01/10-31/10/2012	228,580.27
01/11-30/11/2012	254,427.55
01/12-31/12/2012	254,646.96
01/01-31/01/2013	254,501.00
01/02-30/02/2013	240,848.00
01/03-31/03/2013	265,312.00
01/04-29/04/2013	253,686.00
01/05-31/05/2013	197,327.00
Total	4, 239,263

$BE_y = f_{cap} \times f_{WCM} \times EG_{j,y} \times EF_y = 1 \times 1 \times 4,239,263 \times 0.6441 = 2,815,295\ tCO_2e$.

PJRCES confirms that the calculation method of the baseline emission in the monitoring report and ER calculation spreadsheet is in compliance with the registered VCS PD Version 4, 2 dated 4 January 2012 /22/ and ACM0012 version 4.0.0 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects".

4.5.3. Project Emissions

Project Emissions from electricity consumed

The Project consumes grid-connected electricity for operating waste gas processing equipment. As noted in Section 4.1, the quantity of electricity consumed by the Project ($EC_{PJ,y}$) was calculated based on the equipment rating specified by the manufacturer, and the conservative assumption is that the equipment was in non-stop operation during the entire verification period.

The specifications of the booster fans for LDG and COG are detailed in Table 13 and the imported power to the project is 14,147 MWh during the given monitoring period.

Table 13 Specifications of Booster Fans

	Model, specification and performance	Quantity (set)
COG	450kW	2
LDG	240kW	1

Total electricity consumed is calculated as the following:

(1) FAN for COG

450kW X2set X 24hr X 517 days = 11,167,200 kWh

(2) Fan for LDG

240kW X 24hrs X 517 days = 2,977,920 kWh

The total electricity consumed during the verification period was multiplied by the CO_2 emission factor for the grid (EF_y), which had been previously calculated ex-ante and approved during validation, and the average transmission and distribution loss factor ($_{TDLj,y}$) to determine the quantity of project emissions from electric consumption ($PE_{EL,y}$), as per "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /20/.

$$PE_{EL,y} = EC_{PJ,y} \times EF_y(1 + TD_{Lj,y}))$$

$EC_{PJ,y}$ Project consumes grid-connected electricity for operating waste gas processing equipment (MWh)

$TDL_{j,y}$ 20%, average transmission and distribution loss factor (%)

$$PE_{EL,y} = EC_{PJ,y} \times EF_y(1 + TDL_{j,y}))= 14{,}147 \times 0.6441\ (1 + TDL_{j,y})) = 11{,}274\ tCO_2e$$

Project Emissions from LNG Consumed

The Project also combusts LNG in small quantities with waste gas to make up caloric deficiencies or to warm boilers upon startup. The quantity of LNG consumed by the Project ($AF_{i,j,y}$) was sourced from daily project monitoring data aggregated monthly. Project emissions from LNG consumption ($PE_{AF,y}$) was quantified by multiplying the total LNG consumption by the net calorific value of LNG (NCV_i), sourced from IPCC 2006 /17/ and the CO_2 emission factor for LNG ($EF_{AF,i}$) , according to "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /19/.

Total LNG consumed is verified to be 5,938,594 m^3 /4/ /9/.

Table 14 LNG consumed (NM^3)

Period	LNG consumed used for ER calculation
01/01-31/01/2012	158,351
01/02-30/02/2012	40,305
01/03-31/03/2012	65,917
01/04-29/04/2012	7,582
01/05-31/05/2012	19,267
01/06-30/06/2012	155,922
01/07-31/07/2012	152,134
01/08-31/08/2012	70,232
01/09-30/09/2012	585,936
01/10-31/10/2012	42,579
01/11-30/11/2012	174,902
01/12-31/12/2012	253,351
01/01-31/01/2013	49,130
01/02-30/02/2013	49,406
01/03-31/03/2013	67,320
01/04-29/04/2013	960,218
01/05-31/05/2013	3,086,042
Total	5,938,594

$PE_{AF,y} = AF_{i,j,y} \times NCV \times EF_{AF,i} = 5,938,594 \times 1000/22.4 \times 16 \times 10^{-9} \times 50.4 \times 58,300 = 12,464\ tCO_2e$

Thus, total PE= $PE_{EL,y} + PE_{AF,y} = 11,274 + 12,464 = 23,738\ tCO_2e$

Leakage

There are no leakages that need to be considered in applying the methodology ACM0012 version 4.0.0 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects".

Emission reduction

Therefore, the emission reductions in this monitoring period are:

$ER_y = BE_y - PE_y - L_y$ = 2,815,295 - 23,738 - 0 = **2,791,556** tCO_2e.

$ER_{y,upto\ 31/12/2012}$=1,999,040 tCO_2e

$ER_{y,from\ 01/01/2013}$=792,516 tCO_2e

PJRCES 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. PJRCES confirms that the data and parameters, including spreadsheet formulas and connections, conversions, aggregations, are consistent with the data and parameters set out in the monitoring plan. All the data is consistent with the data sources.

4.6 Comparison between estimated and actual ERs

The estimated annual emission reductions in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/ are 1,774,699 tCO_2e. Hence the estimated emission reductions for the duration of this monitoring period from 01 January 2012 to 31 May 2013 (517 days) are 2,513,751 tCO_2e.

i.e.: 517/365×1,774,699 tCO_2e = 2,513,751 tCO_2e

During the monitoring period, the emission reductions (**2,791,556** tCO_2e) are a little bit higher than the emission reductions predicted *ex-ante* in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/ for an equivalent number of days. This small augment of real emission reductions against the expected emission reductions are acceptable to verification team, mainly from the efficient usage of waste gases.

PJRCES confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed for the project activity.

4.7 Quality of Evidence to Determine GHG Emission Reductions or Removals

Based on the document review and physical site inspection, PJRCES can confirm that all necessary documentation were collected, referenced and aggregated and were easily accessible in hard-copy and electronic format. Measurements are performed by calibrated equipment, and the key data were cross-checked via other sources. No assumptions are used that have any material influence on reported emission reductions.

The evidence provided was sufficient for verification of the project and consistent with the requirements of the VCS Standard, Version 3.4, 08 October 2013 /24/, ACM0012 version 4.0.0 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects", the registered VCS PD Version 4, 2 dated 4 January 2012 /22/ and the Project Monitoring Report and meets generally accepted evidentiary standards for best practice in GHG accounting.

As outlined above, the input data for calculating the emission reductions, the calculating process and the result are complete and transparent. Therefore, PJRCES is able to confirm the accuracy of the emission reductions.

4.8 Management and Operational System

Based on the site visit, the management system for the project has been verified to be in place, such as the management structure of the VCS project, the VCS project management and VCS training /15/, and the competence criteria of VCS personnel involved in the project.

The monitoring and reporting of electricity data /3/ and LNG consumed /4/ is in accordance with the well-established operational procedures. All monitoring meters has been calibrated and maintained periodically to ensure the accuracy of measurement. All data has been archived electronically and/or in hard copy and was accessible during verification site visit.

CDM monitoring manual /10/ is established with detailed allocation of responsibilities. In the manual, the organization structure with the responsibilities, personnel competencies, monitoring procedure and monitoring management have been properly identified and put in place. By interviewing with some staffs, PJRCES confirms that the monitoring management system is implemented following the VCS monitoring manual /10/.

PJRCES confirms that the responsibilities and authorities in the management and operational system for monitoring and reporting are in accordance with the responsibilities and authorities stated in the registered VCS PD Version 4, 2 dated 4 January 2012 /22/ and monitoring plan.

5 VERIFICATION CONCLUSION

PJRCES, Inc. has carried out verification of the emission reductions achieved by the project "Hyundai Steel Waste Energy Cogeneration Project" against the VCS guidance Version 3.4, 4 October 2012. The Project monitoring report, Project design document and the necessary evidence requested during the verification process have been supplied to enable PJRCES to arrive at an opinion on the Hyundai Steel Waste Energy Cogeneration Project. The emission reductions generated from the waste energy recovery through electricity generation and steam supply have been compiled in a transparent manner, the data was found to be accurate within the uncertainty limits of the measurement equipment, and emission reduction calculations were found to include all the required sources.

PJRCES confirms that the Hyundai Steel Waste Energy Cogeneration Project, developed by Hyundai Green power CO., Ltd, was implemented as per the VCS validated PD and that the emission reductions presented in the monitoring report version 2 dated 10 December 2013, are correctly determined as per the VCS Standard, Version 3.4, 08 October 2013 /24/ and the Consolidated Baseline Methodology ACM0012 version 4.0.0 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects". Furthermore, the Project monitoring report and emission data calculations are considered accurate, complete, transparent, and free of material misstatements. The GHG emission reductions are considered verified to a reasonable level of assurance.

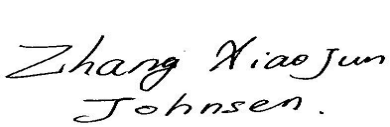
Reporting period: From 01 January 2012 to 31 May 2013

Verified GHG emission reductions or removals in the above reporting period:

GHG Emission Reductions or Removals	**tCO_2e**
Baseline Emissions	2,815,295
Project Emissions	23,738
Leakage	0
Net GHG emission reductions or removals	**2,791,556**

Total Year-Wise emission reductions:

Period	Emission Reductions (tCO_2e)
01 January 2012- 31 December 2012	1,999,040
01 January 2013 – 31 May 2013	792,516
01 January 2012 to 31 May 2013	**2,791,556**



Project Manager

PJRCES

Final Approver

PJRCES

APPENDIX I: DOCUMENTS REVIEWED

No.	Type of document
/1/	CERPD Inc.: Monitoring Report for Hyundai Steel Waste Energy Cogeneration Project, Monitoring Period: 01 January 2012 to 31 May 2013, version 1 dated 11 October 2013 and final version 2 dated 10 December 2013.
/2/	CERPD Inc.: Emission reduction calculation spreadsheet for the Hyundai Steel Waste Energy Cogeneration Project during the monitoring period from 01 January 2012 to 31 May 2013
/3/	Hyundai Green power CO., Ltd: Daily reading record and monthly aggregation record of the electricity supplied to the grid, from 01 January 2012 to 31 May 2013.
/4/	Hyundai Green power CO., Ltd: Daily reading record and monthly aggregation record of the LNG gas consumed, from 01 January 2012 to 31 May 2013.
/5/	Hyundai Steel: Energy consumption data statistics
/6/	Hyundai Steel: Specifications of rated power of LDG fans
/7/	Hyundai Steel: Specifications of rated power of COG fans
/8/	KPX: Electricity sale invoices for the electricity delivered to the grid for the Project during the current monitoring period.
/9/	NG supplier: Monthly invoice of LNG consumption for the monitoring period
/10/	Hyundai Green power CO., Ltd: VCS Monitoring Manual for Hyundai Steel Waste Energy Cogeneration Project
/11/	KPX: Calibration certificates for the meter M1 ,M2, M3,M4, M5, M6, M7 and M8
/12/	Korean Testing Certification Research Institute: Calibration certificates for the flow meters
/13/	Hyundai Green power CO., Ltd: Emergency plan
/14/	Hyundai Green power CO., Ltd: Daily operation and maintenance record
/15/	Hyundai Green power CO., Ltd: VCS monitoring training
/16/	Hyundai Green power CO., Ltd: Commercial operation on 24 March 2010 for Hyundai Steel Waste Energy Cogeneration Project
/17/	IPCC 2006, Table 1.2 of Chapter 1 of Vol. 2 (Energy) of 2006 IPCC Guidelines on Nation al GHG Inventories
/18/	CDM Executive Board: Approved baseline methodology "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects", ACM0012 version 4.0.0. http://cdm.unfccc.int/filestorage/O/E/W/OEW5TY4BFXKIMRJ9ZDNLUC810SHV7Q/EB60_repan05_ACM0012_ver4.0.0.pdf?t=STV8bW9rZDE5fDCqCfqjGM3jGBVn5E1V8SHo
/19/	CDM Executive Board: Version 02 of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", detailed information refers to: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf
/20/	CDM Executive Board: Version 01 of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" detailed information refers to: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf
/21/	First Environment, Inc.: VCS Validation report for the Hyundai Steel Waste Energy Cogeneration Project, version 1 dated 9 February 2012. https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=2&i=786&lat=36%2E982852&lon=126%2E70322&bp=1
/22/	CERPD Inc.: Project Description (PD) for the Hyundai Steel Waste Energy Cogeneration

	Project, final version Version 4, 2 dated 4 January 2012. https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=2&i=786&lat=36%2E982852&lon=126%2E70322&bp=1
/23/	First Environment, Inc.: 1st verification report for the Hyundai Steel Waste Energy Cogeneration Project, version 1.0 03 May 2012
/24/	VCS Standard, Version 3.4, 08 October 2013 http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Standard%2C%20v3.4.pdf
/25/	VCS Program Guide, Version 3.4, 4 October 2012 http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Program%20Guide%2C%20v3.4.pdf
/26/	VCS Validation and Verification Manual, V3.1, 08 October 2013, http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Validation%20Verification%20Manual%2C%20v3.1_1.pdf
/27/	CDM Executive Board: Clean Development Mechanism Validation and Verification Standard, Version 05.0. CDM-EB65-A04-STAN, 4 October 2013 http://cdm.unfccc.int/filestorage/e/x/t/extfile-20131010181547796-accr_stan02.pdf/accr_stan02.pdf?t=VDl8bXYwaHhvfDABi1NKjbfFFBJrFpmnGzdp

APPENDIX II: RESOLUTION OF CORRECTIVE ACTION /CLARIFICATION / FORWARD ACTION REQUESTS

Draft Report Clarification (CL), Corrective Action Request (CAR) or Forward Action Request (FAR) requested by verification team	***Summary of Project owner response***	***Verification team conclusion***
CAR 1 **Energy Balance** The total average percentage of COG, BFG and LDG of January to May 2013 is not correctly calcualted.	It has been upgraded in Monitoring Report ver. 02	OK The total average percentage of COG, BFG and LDG of January to May 2013 is correctly calcualted. CAR 1 was closed.
CAR 2 **electricity consumed** The total electricity consumption of fans for process of COG, LDG from current monitoring period is not correctly calcualted.	It has been upgraded in Monitoring Report ver. 02	OK The total electricity consumption of fans for process of COG, LDG from current monitoring period is correctly calcualted. CAR 2 was closed.
CAR 3 **Editoral Mistake** The total electricity (4,239,263 MWh) sent to grid and total NG consumption (5,938,594 m^3) for second monitoring period are correctly accumulated, but wrong number (4,355,731.01 MWh and 8,925,949 Nm^3) of first monitoring period still remianed in the MR.	It has been upgraded in Monitoring Report ver. 02	OK It is now correct. CAR 3 was closed.
CAR 4 **Original data** ER sheet doesn't provide the original source of data for electricity and LNG	Please see attachment "2nd_ER_reference_data""	OK Original source of data for electricity and LNG has been provided. CAR 4 was closed.

CAR 5 **Calibration of the electricity meter** Most recent availalbe meter calibrations within the current monitoring period are needed to be presented in the MR.	It has been upgraded in Monitoring Report ver. 02	OK Most recent availalbe meter calibrations within the current monitoring period are available. CAR 5 was closed.
CL1 **Monitoring period** Monitoring period is not consistent in the MR, clarificaiton is requested.	It has been corrected.	OK It is consistent now. CL 1 was closed.
CL 2 **Monitoring** Serial No. of electricity meter 1 and 2 are identical same.	Serial number of Meter 2 PT-0808A717-01 not PT-0808A177-01, it's Editorial Mistake.	OK Correct serial No. was applied. CL 2 was closed.

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