



**Verified Carbon  
Standard**

# REDUCTING GAS LEAKAGES WITHIN NORTH, WEST AND OTHER SUB-AREAS OF THE TITAS GAS DISTRIBUTION NETWORK IN BANGLADESH

Document Prepared by

Carbon Check (India) Private Ltd.



<b>Project Title</b>	Reducing Gas Leakages within North West and other sub-areas of the Titas Gas Distribution Network in Bangladesh
<b>Version</b>	2.1
<b>Report ID</b>	CCIPL1028/VERRA/VAL-VER/RGLNW/20211025

<b>Report Title</b>	Reducing Gas Leakages within North West and other sub-areas of the Titas Gas Distribution Network in Bangladesh
<b>Client</b>	Carbon Projects LLC
<b>Date of Issue</b>	15-July-2022

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## Summary:

A brief description of the validation and the project

**Validation:** Carbon Projects LLC has appointed Carbon Check (India) Private Ltd., to carry out the validation of the project “Reducing Gas Leakages within North West and other sub-areas of the Titas Gas Distribution Network in Bangladesh”, with regard to the relevant requirements of VCS Standard Version 4.3.

**Project:** The project is hosted by Titas Gas Transmission & Distribution Co. Ltd. (“Titas”). The company’s headquarters are based in Dhaka, Bangladesh. The gas risers covered under the project boundary are from the following regions: Metro Dhaka (including MD-2, MD-4, MD-5, MD-6)), Narayanganj (including Narayanganj and Sonargaon), Gazipur (including Gazipur and Savar). The project will lead to reductions in methane, a potent greenhouse gas (GHG). The project reduces gas leakages from components in the natural gas transmission and distribution system operated by Titas Gas Transmission and Distribution Company Limited (TGTDC) in Bangladesh.

The purpose and scope of validation

**Purpose:** The purpose of validation is to have a thorough and independent assessment of the proposed project activity against the applicable VCS requirements, in particular, the project's baseline, monitoring plan, and compliance with the relevant VCS and host Party criteria. These are validated to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation

is a requirement for all VCS projects and is seen as necessary to assure stakeholders of the quality of the project and its intended generation of emission reductions. Carbon Check's objective is to perform a thorough, independent assessment of the validation of the project activity.

Scope: Validation scope is defined as an independent and objective review of the Project Description (PD). The PD is reviewed against the relevant criteria and guidance documents provided by VCS which include the following: VCS Program Guide, version 4.2, VCS Standard, version 4.3, Program Definitions, version 4.2, Registration & Issuance Process, version 4.2, VCS Validation and Verification Manual, version 3.2 applicable at the time to confirm that the project meets the applicability conditions of the selected baseline and monitoring CDM methodology AM0023, version 04, also assess the claims and assumptions made in the PD without limitation on the information provided by the project participants.

The method and criteria used for validation

The validation consists of the following four phases:

I. A desk review of the project description documents

- A review of data and information;
- Cross checks between information provided in PD and information from sources with all necessary means without limitations to the information provided by the project proponent;

II. Remote interviews with project stakeholders

- Interviews with relevant stakeholders in the host country with personnel knowing of the project development via telephone, email, or direct on-site visits;
- Cross-checking between information provided by interviewed personnel with all necessary means without limitations to the information provided by the project proponent;

III. Reference to available information relating to projects or technologies similar to the project under validation and review based on the approved methodology being applied for the appropriateness of formulae and accuracy of calculations.

IV. The resolution of outstanding issues and the issuance of the final validation report and opinion.

The number of findings raised during validation

During the course of validation, a total of 4 findings were raised, which include:

01 Corrective Action Requests (CARs);

03 Clarification Requests (CLs);

00 Forward Action requests (FARs). All the raised findings have been closed by the Project Proponent.

Any uncertainties associated with the validation

There are no uncertainties associated with the validation of the project activity. The validation has been done with a reasonable level of assurance.

Summary of the validation conclusion

Carbon Check (India) Private Ltd. concludes the validation with a positive opinion that the VCS Project “Reducing Gas Leakages within North West and other sub-areas of the Titas Gas Distribution Network in Bangladesh” as described in the PD (version 2.1, dated 13/07/2022) /01/, meets all applicable VCS requirements, including those specified in the VCS Standard (v4.3), relevant methodology, tools, and guidelines.

The selected baseline and monitoring methodology (AM0023, version 04) applies to the project and correctly applied. Carbon Check (India) Private Ltd., therefore, requests the registration of the project as a VCS project.

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# 1 INTRODUCTION

## 1.1 Objective

Carbon Projects LLC has appointed the VVB, Carbon Check (India) Private Ltd. to perform a validation of the VCS Project “Reducing Gas Leakages within North West and other sub-areas of the Titas Gas Distribution Network in Bangladesh”. This report summarizes the findings of validation of the project, performed based on the VCS Program Guide, version 4.2, VCS Standard, version 4.3, Program Definitions, version 4.2, Registration & Issuance Process, version 4.2, VCS Validation and Verification Manual, version 3.2. Validation is required for all VCS project activities intending to register under the VCS program. This report contains the findings and resolutions from the validation of the grouped project.

The purpose of validation is to have a thorough and independent assessment of the proposed grouped project against the applicable VCS requirements, in particular, the project's baseline, monitoring plan, and the project's compliance with relevant VCS and host Party criteria. These are validated to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all VCS projects and is seen as necessary to assure stakeholders of the quality of the project and its intended generation of emission reductions, VCU's.

## 1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the Project Description (PD), project design, the project's baseline study and monitoring plan, and other relevant documents. The PD is reviewed against the relevant criteria and decisions by the VCS Program, and the approved baseline and monitoring methodology. Carbon Check has employed a risk-based approach in the validation, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

The validation is not meant to provide any consulting to the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for the improvement of the project design. Validation is carried out based on the following requirements, applicable for this grouped project:

- VCS Standard, Version 04.3
- VCS Program Guide, Version 04.2
- Registration & Issuance Process, version 4.2
- VCS Validation and Verification Manual, version 3.2
- CDM Methodology: AM0023, Version 04

- Other relevant rules, including the host country legislation

### 1.3 Level of Assurance

Reasonable level of assurance

Limited level of assurance

### 1.4 Summary Description of the Project

The proposed project activity aims to reduce potent greenhouse gas (methane) leakage from components into the system and then to the atmosphere. Leaks in the distribution system are caused by normal component wear, thermal and vibrational stresses, and seasonal expansion/contraction cycling from ambient air temperature changes. Natural gas leaks occur through various sources including, ball/gate/plug valves, flanges, and connectors. These components have not been routinely checked for leaks under existing safety practices of TGTDCCL. TGTDCCL operators lack advanced leak detection equipment, advanced repair materials, and trained workers to identify chronically leaking components, accurately measure the leak rates and make reliable repairs to the leaks.

The project activity is planned to reduce natural gas leakage in the distribution network of TGTDCCL. The project implements advanced leak detection and repairs (LDAR) procedures to identify and implement various reduction of methane emissions repair works at components in the natural gas above-ground distribution system, using advanced leak detection and measurement technology including HiFlow Samplers. Leak Measurement Devices and Gasurveyors as well as advanced repair materials. In addition, the selected staff of TGTDCCL will be trained in advanced leak detection, measurement, and repair techniques.

The start date for the project is 01/06/2022 /07/ which is the repair of the first leakage under the project boundary. The project proponent for the project activity is Carbon Projects LLC, which owns the rights to VERs /03/.

The estimated total amount of emission reductions over the chosen 10-year fixed crediting period are 10,909,925 tCO<sub>2</sub>e and the estimated average emission reductions are 1,090,993 tCO<sub>2</sub>e.

The validation team confirms that the project activity, as defined in section 1.1 of VCS PD meets all the relevant requirements for VCS.

## 2 VALIDATION PROCESS

### 2.1 Method and Criteria

Carbon Projects LLC has appointed the VVB, Carbon Check (India) Private Ltd., to carry out the validation of the project “Reducing Gas Leakages within North West and other sub-areas of the

Titas Gas Distribution Network in Bangladesh”, with regards to the relevant requirements of VCS Standard Version 4.3 /B01/.

The validation includes a thorough and independent assessment of the proposed grouped project against the applicable VCS requirements, in particular, the project's baseline, additionality, monitoring plan, and the project's compliance with relevant VCS and host party criteria. The validation involves assessment of the project and confirming that the project meets the applicability conditions of the selected methodology, AM0023, version 04 /B02/ and also assesses the claims and assumptions made in the PD /01/ without limitation on the information provided by the project participants. The overall validation was conducted using Carbon Check's internal procedures.

## 2.2 Document Review

During the document review, CCIPL has applied standard auditing techniques including but not limited to document reviews and remote interviews, review of the applicable/applied methodologies and their underlying formulae, and calculations to assess the quality of the information provided.

This report contains the findings and resolutions from the validation and a validation opinion on the proposed grouped project thus confirming the project design as a document is sound and reasonable and meets the stated requirements and identified criteria.

The VCS project description, emission reduction calculation spreadsheet, and supporting documents related to the project design and baseline were reviewed as per VCS standard version 04.3 /B01/ requirements. The desk review included:

- A review of the data and information presented to verify completeness and consistency in accordance with VCS standard version 04.3 requirements;
- A review of the project description and monitoring methodology, paying particular attention to the applicability conditions of the methodology and baseline and additionality-related requirements.
- A review of the monitoring plan and the project's compliance with relevant VCS criteria.

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

The VCS PD version 01 dated 07/04/2022 /01-a/ was initially reviewed and CCIPL requested the PP to present the supporting information and documents. The documents reviewed by CCIPL are listed below in Appendix 1. Through the process of the validation, the revised VCS PD and the supporting documents were evaluated to confirm the actions taken by the PP to the CARs and CLs issued by the validation team.

The table in Appendix 1 outlines the documentation reviewed during the validation.



## 2.3 Interviews

The table below describes the remote interview process and further identifies personnel, including their roles, who were interviewed, and/or provided information additional to that provided in the project description /01/ and any supporting documents.

	Date	Name	Organization	Topic	Persons Interviewed
/1/	11/06/2022	Daragh Glynn	Carbon Projects LLC	<ul style="list-style-type: none"> <li>• Project Design</li> <li>• Roles and responsibility</li> <li>• Project Implementation</li> <li>• Project start date and Project Location</li> <li>• Methodology applicability</li> <li>• Baseline Scenario</li> <li>• Additionality</li> <li>• Qualification and Training</li> <li>• Monitoring and reporting documentation</li> <li>• Quality Assurance – Management and operating system</li> <li>• Social and Environmental Impacts</li> <li>• Local Stakeholders meeting process</li> <li>• Compliance with relevant laws</li> </ul>	Sanjay Kumar Agarwalla, Manas Halder, and R V Nesari
/2/	11/06/2022	Kevin James	Climate Compass LLC		
/3/	11/06/2022	Oleksandr Potapenko	MBS	Project implementation and operation, monitoring procedure, data and information flow, data management, monitoring instrument maintenance and calibration, training of the PSL staff	
/4/	12/06/2022	S M Rezaul Haque	TGTDCL	Pre project / baseline scenario, Additionality, Leak maintenance under safety and emergency situations	
/5/	12/06/2022	Md Ehsanul Matin Shujan	TGTDCL	Pre project / baseline scenario, Additionality, Leak maintenance under safety and emergency situations	
/6/	11/06/2022	Asma Huque	PSL	Project implementation and operation	
/7/	11/06/2022	Shah Ashequr Rahaman		Project implementation and operation, monitoring procedure, data and	

	Date	Name	Organization	Topic	Persons Interviewed
/8/	11/06/2022	Tanvir Ahmed		information flow, data management, monitoring instrument maintenance and calibration, training of the PSL staff	
/9/	11/06/2022	Dr. V Chowdhury Shahanwaz	Local stakeholder	Local stakeholders meeting	Sanjay Kumar Agarwalla
/10/	11/06/2022	M Tamim	Local stakeholder	Local stakeholders meeting	Sanjay Kumar Agarwalla
/11/	11/06/2022	Saleque Sufi	Local stakeholder	Local stakeholders meeting	Sanjay Kumar Agarwalla

## 2.4 Site Inspections

Carbon Check has conducted an on-site inspection for validation of the proposed project. A reasonable level of assurance has been maintained through the means used for the purpose of validation as follows:

- An assessment of the implementation and operation of the proposed grouped project through on-site interviews with the representatives of the project proponent.
- Confirmation of the pre-project scenario/baseline scenario and additionality
- Confirmation of the applicability of the methodology and monitoring and controlling instruments and operational arrangements.
- Assessment of the project boundaries
- Assessment of the monitoring provisions by checking the monitoring arrangement.

## 2.5 Resolution of Findings

This section summarizes the findings from the validation of the project activity. In this section, the findings from the document review, assessments, and remote interviews are provided.

Material discrepancies identified in the course of the validation are addressed either as CARs, CLs, or FARs.

**Corrective action requests (CAR)** are issued, where:

- mistakes have been made with a direct influence on project results requiring adjustments of the VERs/Vcus monitoring report;
- applicable methodological-specific requirements have not been met.

A **Clarification request (CL)** may be used where additional information is needed to fully clarify an issue or where the information is not transparent enough to establish whether a requirement is met.

A total of 01 CAR and 03 CLs had been raised which have been resolved by the PP. Please refer to Appendix 4 below for the details of the CARs/CLs and their closure.

### 2.5.1 Forward Action Requests

A **forward action request (FAR)** should be issued, where:

- i. the actual project monitoring and reporting practices requires attention and /or adjustment for the consecutive verification period, or
- ii. an adjustment of the MP is recommended.

In the context of FARs, risks have been identified, which may endanger the delivery of high-quality emissions reductions in the future, i.e. by deviations from standard procedures as defined by the MP. As a consequence, such aspects should receive a special focus during the consecutive verification. A FAR may originate from a lack of data sustaining claimed emission reductions.

## 3 VALIDATION FINDINGS

### 3.1 Project Details

The project “Reducing Gas Leakages within North West and other sub-areas of the Titas Gas Distribution Network in Bangladesh”, employs baseline and monitoring methodology; AM0023, version 04 /B02/. The project is hosted by Titas Gas Transmission & Distribution Co. Ltd. (“Titas”). The company’s headquarters are based in Dhaka, Bangladesh. The gas risers covered under the project boundary are from the following regions: Metro Dhaka (including MD-2, MD-4, MD-5, MD-6)), Narayanganj (including Narayanganj and Sonargaon), Gazipur (including Gazipur and Savar). The project will lead to reductions in methane, a potent greenhouse gas (GHG). The project reduces gas leakages from components in the natural gas transmission and distribution system operated by Titas Gas Transmission and Distribution Company Limited (TGTDC) in Bangladesh.

The proposed project activity aims to reduce potent greenhouse gas (methane) leakage from components into the system and then to the atmosphere. Leaks in the distribution system are caused by normal component wear, thermal and vibrational stresses, and seasonal expansion/contraction cycling from ambient air temperature changes. Natural gas leaks occur through various sources including, ball/gate/plug valves, flanges, and connectors. These components have not been routinely checked for leaks under existing safety practices of TGTDC. TGTDC operators lack advanced leak detection equipment, advanced repair materials, and trained workers to identify chronically leaking components, accurately measure the leak rates and make reliable repairs to the leaks.

The project activity is planned to reduce natural gas leakage in the distribution network of TGTDC. The project implements advanced leak detection and repairs (LDAR) procedures to identify and implement various reduction of methane emissions repair works at components in the natural gas above-ground distribution system, using advanced leak detection and measurement technology

including HiFlow Samplers. Leak Measurement Devices and Gasurveyors as well as advanced repair materials. In addition, the selected staff of TGTDCCL will be trained in advanced leak detection, measurement, and repair techniques. Staff within Titas and local implementation partner Prokaushali Sangsad LTD (PSL) will implement the day-to-day Project operations and monitoring activities by performing advanced LDAR activities (detection, measurement, repair, and documentation of leaks) throughout the crediting period. Climate Compass will provide training to local project staff on how to organize and implement an LDAR, utilize advanced measurement equipment and repair materials, and provide its proprietary database and data management system, methodological supervision, and project oversight. Carbon Projects LLC will provide all the funds required to implement the project.

The start date for the project is 01/06/2022 /07/ which is the repair of the first leakage under the project boundary. The project proponent for the project activity is Carbon Projects LLC, which owns the rights to VERs /03/. The crediting period starts on 01/06/2022, which coincides with the starting date of the project activity, and lasts for 10 years, fixed. This is in accordance with paragraph 3.8.1 of the VCS standard version 4.3 /B01/ for non-AFOLU projects.

The estimated total amount of emission reductions over the chosen 10-year fixed crediting period is 10,909,925 tCO<sub>2</sub>e and the estimated average emission reductions are 1,090,993 tCO<sub>2</sub>e.

The indication of the project activity instance location and geographic boundaries is provided in section 1.12. of the VCS PD. They are in accordance with paragraph 3.10.1 of the VCS Standard and can confirm that the project activity boundary is uniquely defined.

The VCS PD clearly indicates the project scope, which is scope 10: Fugitive emissions from fuels (solid, oil and gas). The project is not a grouped project, this is indicated in section 1.2. of the VCS PD.

The proposed grouped project is located in a non-Annex I country. Therefore, the ER generated would not be part of an emission trading program, nor it be located in a jurisdiction or sector with binding limits. The project proponent intends to claim carbon credits under the VCS programme only for the emission reductions achieved. The PP states in the VCS PD that the emission reductions generated by this project will not be used for compliance with an emission-trading program or to fulfill binding commitments. In fact, at the time of validation, no binding targets have been set by Bangladesh under the Kyoto protocol, as indicated on the UNFCCC website.

The project proponent has declared that the project is not in registration under any other GHG program. The validation team has checked the UNFCCC database of registered projects or projects under validation and was able to confirm that the listed projects are not the proposed project activity. A similar project covering other distinct subareas of the Titas service area was registered under CDM (project 10077) which is being proposed for registration under VCS (VCS project reference number 2930). None of the subdistricts, regions, or infrastructure in this project is included in the CDM project. The emission reductions implemented through this project will be demonstrably unique in their location through GPS coordinates and other identification data like street addresses and visual markings and not be included in any other project claiming emission reduction credits under other GHG programs.

The proposed project activity does not generate another form of environmental credit. The project proponent indicates in the VCS PD that the project does not intend to generate any other form of GHG-related environmental credit other than those claimed under this VCS project.

The project contributes not only to emissions reductions but also has many other benefits for the household. It contributes to sustainable development in Bangladesh through:

- Improving environmental quality and minimizing risks for employees and local communities due to the reduction of harmful pollutants (methane);
- Preserving a finite resource (natural gas). The reduction in gas losses will mean that the same amount of service can be provided to customers but with a lesser amount of gas required. Using a finite resource more efficiently, and thus preventing waste of that resource, is an important example of sustainable development;
- Capacity building of the local staff in advanced LDAR techniques;
- Transferring advanced technology in the form of leak detection kits and repair materials that have heretofore not been utilized in this region of Bangladesh;
- Job creations through the hiring of local staff;
- Strengthening human capital in the country through retention and employment of locals to support the project implementation (leak measurement program, repair works, and monitoring).

Section 1.11 of the VCS PD contains a clear summary description of the projects. The completeness and accuracy of the project description were validated through on-site visit interviews.

## 3.2 Safeguards

### 3.2.1 No Net Harm

The validation team confirms that the project does not pose any potential negative environmental and socio-economic impacts. A local stakeholders meeting was conducted for the project and there was no negative feedback.

### 3.2.2 Local Stakeholder Consultation

A local stakeholder consultation meeting was held on 21/10/2021. The key comments made by the local stakeholders were all answered during the local stakeholder consultation meetings and have also been provided in section of 2.2 the PD /01/. The stakeholder meeting conducted by the PP has been listed in section 2.2 of the PD/01/ summary of the local stakeholder participation has been provided.

The validation team confirms the procedure and method for engagement, the method for documenting the outcomes of local stakeholders' consultation, and the account of all inputs received. The validation team confirms that the project proponent has taken due account of all input (no negative comments were received for the project) which was confirmed with interviews with stakeholders during the on-site visit by the validation team. Hence the validation team deemed the local stakeholders meeting procedure including the inputs received as appropriate.

### 3.2.3 Environmental Impact

No significant environmental impacts have been identified by the project proponent due to the implementation of the project activity.

### 3.2.4 Public Comments

The public commenting period for the project was from 10/05/2022 to 09/06/2022. No public comments were received for the project.

### 3.2.5 AFOLU-Specific Safeguards

Not Applicable.

## 3.3 Application of Methodology

### 3.3.1 Title and Reference

The Project applies CDM-approved methodology:

Approved baseline and monitoring methodology for large-scale CDM project activities: AM0023 (Version 04.0.0): “Leak detection and repair in gas production, processing, transmission, storage and distribution systems and in refinery facilities”

### 3.3.2 Applicability

The project applies VCS methodology; VMR0006, version 1.1 /B02-a/. Applicability criteria for the baseline line methodology are assessed by the validation team by means of document reviews and interviews. The validation team confirms that the project activity meets the criteria of the applied methodology.

Relevant applicability condition	Compliance with project activity (VCS PD)	Means of validation
This methodology is applicable to project activities that reduce leaks in components through the introduction of an advanced LDAR program.	The scope of the project activity includes the reduction of gas leaks from components in the natural gas distribution systems of Titas. As a result of the project implementation, advanced LDAR practices will be established. <b>Outcome:</b> The project activity meets the applicability condition.	During the on-site visit, it was checked that the project has introduced advanced LDAR practices to detect, measure, and repair the leaks on the risers. The leaks identified are mainly focused on risers from the residential and commercial zone.
This methodology is applicable under the following conditions: <ul style="list-style-type: none"> <li>▪ During the last three years prior to the implementation of the project activity, no advanced LDAR program was in place to address physical leakage from components that are included in the project boundary.</li> </ul>	During the last three years prior to the implementation of the project activity, no advanced LDAR program was in place to address physical leakage from components that are included in the project boundary. <b>Outcome:</b> The project activity meets the applicability condition.	During on-site visit interviews with the representatives of PP and TGTDCI, the validation team confirmed that in the past three years there were no repairs carried out as part of the LDAR program. TGTDCI has also given a declaration in this respect /20/ confirming no advanced LDAR program was in place to

Relevant applicability condition	Compliance with project activity (VCS PD)	Means of validation
		address physical leakage from components that are included in the project boundary.
<p>This methodology is applicable under the following conditions:</p> <ul style="list-style-type: none"> <li>New physical leaks that are detected at components during the crediting period (e.g., not at the time the project starts) are accountable only if the components were included in the project boundary at the validation of the project activity</li> </ul>	<p>The project will only address components that were included in the project boundary at the validation of the project activity. For instance, the project boundary will not include new sections of the distribution network.</p> <p><b>Outcome:</b> The project activity meets the applicability condition.</p>	<p>PP has confirmed that new leaks detected in new sections of the distribution network will not be accounted for in ER calculations. It is checked that the PP maintains data base both hard and soft copy, which ensures that there are no new leaks added to the database. PP has also provided a self-declaration in this respect /20/.</p>
<p>This methodology is applicable under the following conditions:</p> <ul style="list-style-type: none"> <li>Physical leaks that need to be repaired due to current regulations and legislation are accountable only if it can be demonstrated that relevant regulations and legislation are not enforced in the country.</li> </ul>	<p>National regulations (i.e., the «natural gas security law» called «Praktik Gas Nirapatta Bidhimala, 1991 (Revised in 2003) only focus on leaks that present a safety concern. However, they do not specify exactly what counts as a safety concern– this is left to the discretion of the gas company. Historically reported leaks have only occurred in underground piping, with no leaks flagged in above-ground components. Typically, leaky above-ground components are well ventilated and do not pose a major safety risk and therefore have not been included in compliance activities.</p> <p><b>Outcome:</b> The project activity meets the applicability condition.</p>	<p>The validation team checked the National regulations (i.e., the «natural gas security law» called «Praktik Gas Nirapatta Bidhimala, 1991 (Revised in 2003) and confirms that there is no regulation and legislation, which requires the PP to detect and measure the leakages.</p>
<p>This methodology is applicable under the following conditions:</p> <ul style="list-style-type: none"> <li>The most likely baseline scenario is the continuation of the current practice</li> </ul>	<p>The continuation of the current situation with existing practices of leak detection and routine maintenance is the most likely baseline scenario.</p> <p><b>Outcome:</b> The project activity meets the applicability condition.</p>	<p>The validation team confirms that the most likely baseline scenario is the continuation of the current practice. For a detailed assessment, please refer to section 3.3.4 of this report.</p>

Relevant applicability condition	Compliance with project activity (VCS PD)	Means of validation
<p>This methodology is not applicable to:</p> <ul style="list-style-type: none"> <li>▪ Physical leaks that are detected and repaired under a conventional LDAR program.</li> </ul>	<p>Physical leaks detected and repaired as part of the current maintenance program will not be covered by the proposed project activity. The leaks repaired under current practices by the Emergency Repair team will be excluded from the project. The proposed project aims at reducing leaks that will be detected using advanced technology and repaired using advanced repair materials (i.e., under the advanced LDAR). Only those leaks measured using advanced equipment and repaired using advanced materials supplied by the project can be included in the project.</p> <p><b>Outcome:</b> The project activity does not meet the exclusion condition.</p>	<p>The leaks detected and repaired under current practices are performed by the emergency team of the respective gas transmission and distribution company and this is not included in the proposed project. Also, note that the leaks repaired by the emergency team don't measure the leak. Further, they do not have access to the equipment used under the LDAR program. This was confirmed during the on-site visit interviews with TGTDC and PSL personnel and also a self-declaration has been provided in this respect /20/.</p>
<p>This methodology is not applicable to:</p> <ul style="list-style-type: none"> <li>▪ Physical leaks that can be repaired by tightening/re-greasing or by similar measures</li> </ul>	<p>Physical leaks that can be repaired by tightening/re-greasing (incl. connectors and plug valve stems) or by similar measures will not be covered by the proposed project activity. Only leaks repaired by using advanced repair materials and new parts will be included.</p> <p><b>Outcome:</b> The project activity does not meet the exclusion condition.</p>	<p>It is checked from the database that the LDAR programme doesn't cover the Physical leaks that can be repaired by tightening/re-greasing or by similar measures. This was confirmed during the on-site visit interviews with TGTDC and PSL personnel and also a self-declaration has been provided in this respect /20/.</p>
<p>This methodology is not applicable to:</p> <ul style="list-style-type: none"> <li>▪ Physical leaks that are identified on components where the latest scheduled maintenance or replacement was not done before the starting date of a project activity as documented through maintenance logs, maintenance schedules, maintenance guidelines, worker logbooks, or other similar sources</li> </ul>	<p>No regularly scheduled maintenance and replacement occur currently in the gas distribution system. Only major, typically underground systems, are repaired and this is done on an ad hoc basis when a dangerous leak arises. These will be repaired by the emergency repair team and not be included in the project activity. No regularly scheduled replacement occurs. Component replacement is only done when a part fails.</p>	<p>During the site visit and interactions with the gas company representatives, it was confirmed that there is no scheduled maintenance. The leaks are repaired only if there is a complaint from the user. A self-declaration has been provided in this respect /20/.</p>



Relevant applicability condition	Compliance with project activity (VCS PD)	Means of validation
	Replacements done as a result of a failed part are not included in the project activity. <u><b>Outcome:</b></u> The project activity does not meet the exclusion condition.	
This methodology is not applicable to: <ul style="list-style-type: none"> <li>▪ Reductions in process venting</li> </ul>	The proposed project activity aims at reducing natural gas leakages from components (e.g., valves) in the natural gas distribution network. As such, leakages associated with the project activity are not related to process venting. <u><b>Outcome:</b></u> The project activity does not meet the exclusion condition.	There are no reductions in process venting. This criterion is not applicable.
This methodology is not applicable to: <ul style="list-style-type: none"> <li>▪ Reductions in natural gas or refinery gas combustion by process heaters or boilers, engines and thermal oxidizers</li> </ul>	The project does not cover any reductions in natural gas or refinery gas combustion by process heaters or boilers, engines, and thermal oxidizers. <u><b>Outcome:</b></u> The project activity does not meet the exclusion condition.	Not applicable

### 3.3.3 Project Boundary

All physical leaks detected at valves will be clearly referenced in a database to ensure their identification and monitoring including GPS coordinates. Each above-ground location will be tagged with unique geographical coordinates for the purposes of easy identification and monitoring. The project boundary will be defined in detail in a database, of all the leaking components identified and repaired during the baseline study completed on the above-ground equipment in the Titas gas system for the regions highlighted in section 1.12 of the VCS PD. Also, the project boundary will not include new sections in the distribution network, constructed after the project baseline definition. Thus, the number of components within the project boundary will always remain the same as at the start of project implementation.

### 3.3.4 Baseline Scenario

As per the methodology, the selection of the baseline scenario and the demonstration of additionality need to be conducted using the Combined tool to identify the baseline scenario and demonstrate additionality, and the same has been discussed and demonstrated in section 3.4 of the PD /01/.

The baseline determination follows a four-step process described in the “Combined tool to identify the baseline scenario and demonstrate additionality” version 07.0 /B03/, as below:

## Step 1: Identification of alternative scenarios

### Step 1a: Define alternative scenarios to the proposed CDM project activity:

It is identified the scenarios chosen by the PP and provides the same output as the proposed project activity.

1. Continuation of the current situation with existing practices of leak detection and routine maintenance;
2. The proposed project activity is undertaken without being registered as a VCS project activity; and
3. Similar efforts have been made or are expected to be made to reduce methane leaks from key components, using similarly capable leak detection and measurement technology as described in AM0023 (Version 04.0.0).

### Sub-step 1b: Consistency with mandatory applicable laws and regulations:

It is checked that, all the above-mentioned three scenarios are as per the host country's applicable laws and regulations provided below /06/:

- Gas safety rules, 2003
- Gas distribution rules (Domestic) & (Industry) 2014
- Gas Act, 2010
- Draft gas distribution policy (others) & (domestic), 2013
- Gas Marketing Law, 2013

It is confirmed that activities included in the proposed project activity (systematic leak detection and repair program) are neither prohibited nor required by the existing mandatory laws and regulations. The same was also confirmed during the site visit by interviewing the representatives of the distribution gas company (TGTDCCL). Thus, all three alternatives discussed in the PD are consistent with applicable laws and regulations.

## Step 2: Barrier analysis

The barrier analysis has been demonstrated by means of “Guidelines for objective demonstration and assessment of barriers”, version 01 /B03/. The PP has demonstrated investment barriers and technological barriers for demonstration of additionality of the project activity, which can impact the implementation of the alternative scenarios 2 and 3 as demonstrated below:

### Sub-step 2a: Identify barriers that would prevent the implementation of alternative scenarios:

#### Investment barriers, other than insufficient financial returns:

The validation team could confirm that there are no similar activities carried out in the host country without the benefits of CDM / VCS. However, the validation team found that there are 5 other similar

projects in the host country that are registered under CDM having UNFCCC reference numbers 10077, 10559, 10560, 10561, and 10562 /B04/. Thus, no similar projects have been implemented without grants or other non-commercial financing terms.

It is also checked that “No private capital is available from domestic or international capital markets due to real or perceived risks associated with investments in the country where the project activity is to be implemented, which is demonstrated and confirmed by the credit rating of the host country, Bangladesh. This could be verified by Standard & Poor and Moody’s Standard & Poor which currently rate Bangladesh as BB-<sup>1</sup> and Moody’s as Ba3<sup>2</sup>. This makes Bangladesh a country considered a non-investment grade speculative

PP has further tried to demonstrate the investment barrier using access to finance barrier using “Guidelines for objective demonstration and assessment of barriers”, version 01 /B03/ and as per this guideline “*While demonstrating barriers related to the lack of access to capital, technologies and skilled labour, the project proponents shall provide information on the nature of the companies and entities involved in the financing and implementation of the project*”.

TGTDCL is a gas marketing company under Petrobangla that supplies natural gas at the doorstep of the people. As estimated from the report of Carbon Project Management /19/, the cost to implement the proposed project activity will include the equipment cost (which includes 6 Hi-Flow Samplers and leak detection devices), consulting cost related to staff training, the labour cost of additional staff, IT equipment cost and advanced repair material cost. In addition, the cost associated with fixing each leaking component (like valves, insulating joints, etc.) may need repair during the project implementation. The validation team also checked the cost of the equipment with the quotations received from Heath consultants for HFS and Gas surveyor /19/. It was further checked and confirmed that all cost assumptions are based on actual invoiced cost, contract agreement with PSL, contract on consultancy services, and past experience on similar projects /19/. The total estimated cost for baseline study and first monitoring is USD 868,100 and USD 377,200 each year for subsequent monitoring.

On review of the annual report for TGTDC /26/, it is confirmed that the annual maintenance budget covering all maintenance services including emergency workers and operations for the fiscal year 2019-20 there is no budget for preventing leaks from the above-ground residential and commercial risers.

As per the on-site visit interviews with the representatives of TGTDCL and the contract between TGTDCL and Carbon Projects LLC /08/, the entities involved in the financing and project implementation is only Carbon Projects LLC and the only revenue from the project is the credits generated from the proposed project activity, which clearly demonstrates that revenues from the VCS project, alleviates the barrier.

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<sup>1</sup> <https://tradingeconomics.com/bangladesh/rating>

<sup>2</sup> <https://tradingeconomics.com/bangladesh/rating>

### Technological Barrier:

As per the on-site visit observations and interviews with the stakeholders, it is confirmed that the technology (LDAR) envisaged by the project activity has never been used in Bangladesh, except for 5 projects either registered under CDM as explained above. It is also checked that the Hi-Flow sampler is made by only one company (Bacharach, Inc.) in the United States, and this technology has never been used outside Annex 1 countries (except donor-funded programs in Ukraine, Kyrgyzstan, India, Brazil, and other CDM/JI projects) as confirmed from the registered CDM projects in Bangladesh. Thus, considering the equipment cost and no direct experience with the operational benefits of the device in Bangladesh, it is highly risky for any entity to invest in such projects, especially when there is no supplier available locally. As per the interviews had with MBS Ltd representatives the advanced repair materials required for an advanced LDAR program are not available at local shops and suppliers and are purchased from abroad (like France, Italy, and the US) at significantly higher prices as compared to cheaper local materials currently used, which was also checked and confirmed during the site visit.

As per the interviews with the operation and maintenance team of TGTDC, it was confirmed that skilled and/or properly trained labour to operate and maintain the technology is not available in the applicable geographical area i.e. Bangladesh. It was checked that the leak detection, measurement, and repairs are carried out by a third party (PSL) located in Bangladesh. The team from PSL is trained by technical experts from MBS with significant experience in gas leak detection and measurement, and advanced repair materials to be used in the project. The training is provided with detailed instructions and written materials on how to conduct leak detection, measurements and repairs, calibration, repair approaches, and reporting. Furthermore, members of the local gas companies are also trained as part of the project to ensure that they understand the details of the project implementation techniques and can oversee the project.

In conclusion, it is the validation team's opinion that such projects incur high costs to procure equipment as well as build technical capacity among the staff.

Step 2b: Eliminate alternative scenarios which are prevented by the identified barriers

Based on the above-mentioned assessment of barriers, the validation team confirms that identified plausible baseline scenarios 2 and 3 could not be implemented without additional support from the VCUs revenues. Scenario 1, i.e. continuation of the current situation with existing practices of leak detection and routine maintenance (i.e. Business as Usual) does not lead to additional procurement costs and continues to be the most plausible scenario without any barriers.

The outcome of Step 2: "Continuation of the current situation with existing practices of leak detection and routine maintenance" scenario 1 is assessed as the most plausible baseline scenario.

Step 3: Investment analysis

As per the previous steps, only one scenario remains and as per the Combined tool to identify the baseline scenario and demonstrate additionality”, version 07, if only one scenario remains, step 3 can be skipped. Thus, investment analysis is not applicable.

#### Step 4: Common practice analysis

As discussed in the definitions section of the “Combined tool to identify the baseline scenario and demonstrate additionality”, the proposed project activity does not apply any of the measures and thus, Step 4 a is not applicable.

Step 4b: The proposed CDM project activity(s) does not apply any of the measures that are listed in the definitions section above

The proposed project aims to implement an advanced LDAR programme across the TGTDCI transmission and distribution network. The geographical country selected to justify the common practice analysis is the host country Bangladesh and as per the interviews with TGTDCI representatives and stakeholders held during the site visit, it was confirmed that there are no similar activities in Bangladesh, which are in place without the support of CDM / VCU revenues.

The outcome of step 4: Since the proposed project activity is not regarded as common practice, the project activity is considered to be additional.

The validation team confirms that the baseline scenario opted by the project activity is in accordance with the requirements of the applied methodology /B02/ and is justified.

### 3.3.5 Additionality

The additionality of the project has been established by applying the “Combined tool to identify the baseline scenario and demonstrate additionality”, version 07.0 of /B03/.

The PP has demonstrated additionality using Barrier analysis. The “Guidelines for objective demonstration and assessment of barriers”, version 01 /B03/applies two barriers i.e. investment barrier and technological barrier. The validation team has verified all sources/ references provided and found that the assumptions and information provided in section 3.5 of the PD are appropriate. For more information, please refer to section 3.3.4 above.

### 3.3.6 Quantification of GHG Emission Reductions and Removals

The equations and choices provided in the methodology and all other methodological tools are correctly quoted in the PD /01/. The emission reductions of the project instances of the project would be calculated using the formulae mentioned in the applied CDM methodology; AM0023, version 04 /B02/.

The validation team based on the review of the PD /01/, confirms that the formulae are correctly presented for the determination of emissions reductions. The parameters and equations presented in the PD /01/, as well as other applicable documents, have been compared with the information and requirements presented in the methodology.

The validation team checked the Emission Reduction calculation sheet /02/ and confirms the equations used have been correctly applied and as per the selected methodologies AM0023 “Leak detection and repair in gas production, processing, transmission, storage, and distribution systems and in refinery facilities”, version 04 /B02/. The same was also cross-checked with the PD and found to be in order.

Baseline emissions:

Baseline emissions are determined based on the quantity of methane emitted through physical leaks that are detected and repaired as part of the project activity (i.e., by the advanced LDAR program).

As per the applied methodology, Baseline emissions are calculated in these four steps:

Step 1: Establishment of criteria to identify which types of physical leaks are eligible for crediting.

Step 2: Establishment of a database to manage all information related to the project activity.

Step 3: Documentation of the schedules for the maintenance and replacement of components.

Step 4: Calculation of baseline emissions.

Step-1: Establishment of criteria to identify which types of physical leaks are eligible for crediting

As per the methodology AM0023, Version 04, PP has discussed and assessed the current leak detection and repair practices in the PD /01/. It was also checked and confirmed that the PP has established relevant methods to identify the detection and repair of a physical leak during project implementation that would also have occurred under conventional LDAR. During the on-site visit, the validation team checked the current leak detection and repair procedures within TGTDCCL by interacting with the representatives of TGTDCCL and it could be confirmed that currently, they do not have any procedures in place to detect the leak and repair. It is the responsibility of the emergency team to repair the leaks and the repairs are only done when they receive complaints. TGTDCCL is equipped with 24/7 emergency hotline numbers, which register the complaints, and actions are carried out by the emergency team only when a complaint is received on the leak. It is also checked that as such there are no regular leak detection checks in the annual maintenance. The emergency team does not have access to equipment involved in LDAR, the current leak detection and repair practices in TGTDCCL is confirmed to be only for two types of physical leaks incl. Emergency / Safety repairs, and Leaks detected by visibility, audibility, and/or smell. It is also checked and confirmed that as per the regulations in Bangladesh, there is no specification on what exactly counts as a safety concern – this is left to the discretion of the gas company. However, safety concerns for above-ground leaks are defined by operational staff as being cases where there is a significant risk to public health and safety of the gas distribution system (e.g., explosion or inflammation risk, or where a high concentration of gas can accumulate in an enclosed space (risk of suffocation due to lack of oxygen)). However, the majority of the above-ground leaks in the TGTDCCL network do not fall under this category (i.e., components are typically located outdoors, in open spaces). As per the interactions had with the operation and maintenance team of TGTCL the repair materials involved are (PE tape, clamps, and non-gas-rated Teflon tape), which are ineffective at repairing leaks.

The validation team is of the opinion that without the Hi-Flow samplers or other equivalent technology, the TGTDCCL emergency team has no access to detect the leak, measure the leak, and judge the size and importance of the leaks to implement the correct measure to repair the leak. The validation team

confirms that all repairs consisting of tightening loose fittings and connections (e.g., threaded fittings, unions) are excluded from the project as it is plausible that they could be detected and repaired under the current practices. From the site visit observations, it was also noted that no leak detection and repairs are carried out at risers and the proposed project focuses on leak detection, measurement, and repairs at risers, which includes residential as well as commercial, which excludes industries.

Step-2: Establishment of a database to manage all information related to the project activity

During the on-site site visit, the validation team checked that the PP maintains full data base which is available in hard as well as soft. It was also checked that the team that maintains the database is well trained by a qualified and competent tutor from MBS LTD and only the qualified trainer (passes in theoretical as well as particle exams) is eligible to perform such activities. It is also checked the database is sent to MBS Ltd every week, to make sure there are no errors and inconsistent entries. The data collected during the implementation phase and through the crediting period is discussed in detail in the PD. It was also checked and confirmed that each leak identified and repaired is identified based on the following:

- Location of the regulator system (street address and building number)
- Region
- Names of lead technical operators
- Date of leak detection
- Detection method (name and ID of equipment)
- Screening value of leak rate in liters per minute (lpm)
- Weatherproof tag attached leaky point with key data about leak and repair Type of facility surveyed such as City Gate Station (CGS), Town Border Stations (TBS), District Regulating Stations (DRS), Commercial or Residential Regulating and Metering Stations (RMS)
- Unique leak ID number
- Type of component that is leaking
- Location of the component that is leaking (e.g. GPS coordinates)
- Digital photo of Leak
- Any other relevant observations

Step-3: Documentation of the schedules for the maintenance and replacement of components.

It was informed by the TGTDCCL representatives during the site visit that the distribution company does not maintain/ or have a schedule for the maintenance and replacement of components for the above-ground components, except in the following two cases in which the components would have been replaced under normal practice: 1. In emergency situations when the component has ceased to function; and 2. Those components in the priority list can be replaced based on annual budget allocations as they are made known. And the components identified in the above two scenarios will

not be included in the project activity, as documented in the PD /01/ and checked from the ER spread sheet /02/. Thus, it is reasonable to consider the maximum period for which baseline emissions from leaks are accountable is the end of the chosen fixed 10 years crediting period.

#### Step-4: Calculation of baseline emissions

Option 2 of the methodology has been chosen to measure the flow rate of the physical leaks through the use of a Hi-Flow™ Sampler, calibrated bag, or other suitable flow measurements technology, which has been taken by the PP in calculating the baseline emissions, which cannot be changed during the crediting period, as explained in the PD /01/. In addition, the baseline emissions are capped to the baseline emission level of the first year of the crediting period, which is in line with the applied methodology.

The baseline emissions are calculated as follows:

$$BE_y = \min \left\{ BE_1, ConvFactor \times \sum_j [F_{CH_4,j} \times T_{j,y} \times (1 - UR_j)] \times GWP_{CH_4} \right\}$$

With,

$$BE_1 = ConvFactor \times \sum_j [F_{CH_4,j} \times T_{j,y=1} \times (1 - UR_j)] \times GWP_{CH_4}$$

Where:

- BE<sub>1</sub> = Baseline emissions for the first crediting year of the crediting period (tCO<sub>2e</sub>).
- BE<sub>y</sub> = Baseline emissions for crediting year y (tCO<sub>2e</sub>)
- ConvFactor = Conversion factor to convert Nm<sup>3</sup> CH<sub>4</sub> into tCH<sub>4</sub>. The Hi-Flow sampler automatically accounts for standard temperature and pressure in data readings; as such this factor amounts to 0.0007168tCH<sub>4</sub>/Nm<sup>3</sup> CH<sub>4</sub> (i.e., 0 degree Celsius and 101.3 kPa).
- j* = All physical leaks that are included in the project activity for which physical leaks were detected and repaired and which would leak in the baseline scenario during the crediting year *y*.
- F<sub>CH<sub>4</sub>,j</sub> = Measured flow rate of methane for the physical leak *j* from the leaking component (Nm<sup>3</sup> CH<sub>4</sub>/h)
- UR<sub>*j*</sub> = Uncertainty range for the flow rate measurement method applied to physical leak *j*. The uncertainty of the measurement is taken into account by using the flow rate at the lower end of the uncertainty range for the measurement at a 95% confidence interval for baseline emissions from leaks
- T<sub>*j*,y</sub> = The time the relevant component, in which physical leak *j* occurred, would leak in the baseline scenario and would be eligible for crediting during the crediting year *y* (hours)



$GWP_{CH_4}$  = The global warming potential for methane valid for the commitment period (tCO<sub>2</sub>e/tCH<sub>4</sub>). After the commitment period, this value may be revised based on any decision by the CMP.

Uncertainty is calculated using the following formula:

$$UR_j = \frac{\sqrt{(UR_1 * x_1)^2 + (UR_2 * x_2)^2 + \dots + (UR_n * x_n)^2}}{x_1 + x_2 + \dots + x_n}$$

Where

$UR_j$  = the percentage uncertainty in the sum of the quantities (half the 95% confidence interval divided by the total (i.e. mean) and expressed as a percentage);

$x_n$  and  $UR_n$  = the uncertain quantities and the percentage uncertainties associated with them, respectively.

(Note: “n” in this case refers to each recorded leak rate of each component surveyed)

For all physical leaks detected, the following assumptions are applied in calculating the baseline emissions:

- For components where no physical leaks were detected at the initial baseline survey and where the physical leak(s) were detected during a subsequent survey, baseline emissions shall be accounted from the moment when the leak was detected;
- Baseline emissions from a specific leak  $j$  or a specific component  $r$  are included in the calculations until whichever of the following occurs first:
  - The component concerned is replaced for a non-leak-related reason (i.e. it breaks down); or
  - The end of the last crediting period of the overall project activity; or
  - The maximum period for which a specific leak can be accounted for emission reductions is over. This maximum period is the end of the crediting period (i.e., 10 years).

Project emissions:

For project emissions, it is required to include physical leaks that take place on components included in the project boundaries in the following cases:

- If a repair of a physical leak ceases to function, for as long as it is not repaired again; or
- If a new physical leak is detected in a component that was part of the initial baseline survey and for which no physical leak was detected during that survey, as long as that physical leak is not repaired.

Project emissions are calculated using the following formula (Option 2):

$$PE_y = ConvFactor \times \sum [F_{CH_4,z} \times T_z \times (1 - UR_z)] \times GWP_{CH_4}$$

Where:

PE<sub>y</sub> = Project emissions in crediting year y ((tCO<sub>2e</sub>)

*ConvFactor* = Conversion factor to convert m<sup>3</sup> CH<sub>4</sub> into Tch<sub>4</sub>. The Hi-Flow sampler automatically accounts for standard temperature and pressure in data readings; as such this factor amounts to 0.0007168 tCH<sub>4</sub>/Nm<sup>3</sup> CH<sub>4</sub> (i.e., 0 degree Celsius and 101.3 kPa).

z = All leaks that are accounted for as project emissions during the crediting year y

*FCH<sub>4</sub>* = Measured leak flow rate of methane for the physical leak z from the leaking component (m<sup>3</sup> CH<sub>4</sub>/h)

UR<sub>z</sub> = Uncertainty range for the flow rate measurement method applied to physical leak z. The uncertainty of the measurement is taken into account by using the flow rate at the upper end of the uncertainty range for the measurement at a 95% confidence interval for project emissions from leaks.

T<sub>z</sub> = The time the relevant component has been leaking during the crediting year y

GWPC<sub>H<sub>4</sub></sub> = Global warming potential of methane valid for the commitment period ((tCO<sub>2e</sub> /tCH<sub>4</sub>).

The following assumptions are made in the calculation of project emissions:

If a repair of a physical leak ceases to function, it is conservatively assumed that the leak resumed either:

- At the same flow rate that was measured prior to its repair when using only leak detection equipment;
- At the newly measured leak rate if the leak is re-measured using leak measurement equipment at the time of monitoring (in case of Option 2);

It is further assumed that the leak resumed on the day when the leak was last checked and confirmed not to leak and that it continued to leak for the entire time since that date. Thus, leaks, where the repair failed and are not immediately re-repaired, are included in the project emissions.

For components where no physical leak was detected at the initial baseline survey and where the physical leak(s) were detected during subsequent surveys, project emissions from these components shall be accounted since the moment when the leak was detected.

Project emissions from a specific physical leak are included in the calculations until whichever of the following are earlier:

The date of any repair of the physical leak as long as the repair does not cease to function; or the equipment concerned is replaced (i.e. it breaks down).

As per the applied methodology AM0023, version 04 /B02/ no leakage effects are accounted for. Thus, there will no leakage emissions from the project activity.

According to the applied methodology, the emission reductions are calculated as:

$$ER_y = BE_y - PE_y$$

The estimated total emission reductions during the 10 year fixed crediting period are 10,909,925 tCO<sub>2e</sub> and an average of 1,090,992 tCO<sub>2e</sub> per year as indicated in the VCS PD /01/ and also in the ER spread sheet /02/.

In conclusion, all values used in the VCS PD to calculate emission reductions are considered reasonable in the context of the proposed project and the calculation approach is correct.

### 3.3.7 Methodology Deviations

No methodology deviations have been applied to the project activity.

### 3.3.8 Monitoring Plan

The project employs CDM baseline and monitoring methodology AM0023, version 04 /B02/. According to sections 5.1 and 5.2 of PD /01/ the parameters determined ex-ante and those to be monitoring ex-post as per the requirements of the methodology are given below.

#### Parameters Determined ex-ante

The following parameters are determined ex-ante and mentioned in section 5.1 of the PD:

Parameter	Unit	Value	Assessment
GWP <sub>CH4</sub>	tCO <sub>2e</sub> /tCH <sub>4</sub>	28	-Fixed ex-ante The value is based on VCS Standard, version 4.3, section 3.14.4
ConvFactor	tCH <sub>4</sub> / Nm <sup>3</sup> CH <sub>4</sub>	0.0007168	- Fixed ex-ante - conversion factor (ConvFactor) of 0.0007168 reflects the methane density at 0 degrees Celsius and 101.3 kPa, which is derived by dividing the methane density at standard conditions by the Avogadro constant (22.414 l/mol). This value is taken from the US Government PubChem Database where it is listed in grams/litre. It is converted to tonnes per litre using standard unit conversion (gram/litre=0.001 tonne/cubic meter). It is applied to

Parameter	Unit	Value	Assessment
			convert Nm <sup>3</sup> CH <sub>4</sub> to tCH <sub>4</sub> .

#### Parameters monitored ex-post

Sl.No.	Parameters	Description
1	$T_{j,y}$	The time the relevant component, in which physical leak j, occurred, would leak in the baseline scenario and would be eligible for crediting during the crediting period y (hours)
2	$T_z$	The time (in hours) the relevant component has been leaking following leak identification during the crediting period y
3	Temperature and pressure of natural gas	The temperature and pressure at the point at the time of measurement
4	$UR_j$	The uncertainty range for the measurement method applied to leak j
5	$UR_x$	The uncertainty range for the measurement method applied to reappeared leak z that is not re-repaired and therefore counted as a project emission
6	$FCH_4, j/FCH_4, z/$	The leak flow rate of methane for leak (j, z) from the leaking component
7	$BE_{CAP}$	Capped quantity of the baseline emissions, defined as the baseline emissions for the first year of the crediting period

In accordance with section 3.21.1 of the VCS Standard, version 4.3 /B01/ all documents and records will be kept in a secure and retrievable manner. The data collecting and management methods as provided in section 5.3 of the VCS PD /01/ are acceptable to the validation team. The validation team interviewed representatives of PP and it was established that the database of all the project equipment distributed by PP is created and maintained.

The validation team considers that the means of implementation of the monitoring plan, including the data management, monitoring equipment, and quality assurance and quality control procedures, are sufficient to ensure that the emission reductions achieved by/resulting from the proposed project therein can be reported ex-post and verified.

The validation team confirms that the overall monitoring plan complies with the requirements of the methodology AM0023, version 04 /B02/, the monitoring arrangements described in the monitoring plan are feasible within the project design and the project proponents will be able to implement the described monitoring plan.

### 3.4 Non-Permanence Risk Analysis

This is not applicable to the project activity as the Project is not an AFOLU (Agriculture, Forestry and Other Land Use) project.

## 4 VALIDATION CONCLUSION

The Project Participant, Carbon Projects LLC, has commissioned the VVB, Carbon Check (India) Private Ltd. to perform an independent validation of the VCS Project Activity “Reducing Gas Leakages within North West and other sub-areas of the Titas Gas Distribution Network in Bangladesh”. This report summarises the findings of the validation of the project, performed based on VCS criteria, as well as criteria are given to provide for consistent project operations, monitoring, and reporting.

The validation process was performed based on all guidance and criteria as provided in VCS Standard, version 4.3, VCS Program Guide, version 4.2, VCS Validation and Verification Manual version 3.2 and Registration & Issuance Process version 4.2 /B01/.

The project activity provides the information in PD/01/ as required by the VCS Standard /B01/ and Validation and Verification Manual /B01/ and in Carbon Check’s opinion meets the requirements of the applied baseline and monitoring methodology, AM0023, version 04 /B02/ and is likely to achieve the estimated emission reductions. The validation has been performed using a risk-based approach, as described above. The expected annual average emission reductions from the project activity are 1,090,993 tCO<sub>2e</sub> and the total for the crediting period is 10,909,925 tCO<sub>2e</sub>.

Carbon Check (India) Private Ltd concludes the validation with a positive opinion that the VCS Project Activity “Reducing Gas Leakages within North West and other sub-areas of the Titas Gas Distribution Network in Bangladesh”, as described in the PD /01/, meets all the applicable VCS requirements, including those specified in the Project Standard, relevant methodology, tools, and guidelines.

The selected baseline and monitoring methodology AM0023, version 04 is applicable to the project and correctly applied. Carbon Check (India) Private Ltd, therefore, requests the registration of the project as a VCS project activity.

CCIPL’s validation opinion is purely based on the information made available to us by the project proponent during the course of validation and hence CCIPL cannot guarantee the accuracy or correctness of the information. Keeping this in mind, no party can hold CCIPL liable for any decisions made or not made in this report.

## APPENDIX 1.1: REFERENCE DOCUMENTS

Ref	Document
/01/	<ul style="list-style-type: none"> <li>a. VCS PD, version 1, dated 07/04/2022</li> <li>b. VCS PD, version 2, dated 25/06/2022</li> <li>c. VCS PD, version 2.1, dated 13/07/2022</li> </ul>
/02/	Emission reduction calculation spread sheet
/03/	Proof of right of VCUs and project ownership (Investment Agreement Titas Gas-NEC, dated 25/10/2021)
/04/	<p>Declaration(s) from Project proponent on the following:</p> <ul style="list-style-type: none"> <li>• The project is not registered or under the process of registration in any other Emissions Trading Programs and Other Binding Limits</li> <li>• The project is not registered or in process of getting Other Forms of Environmental Credit</li> <li>• The project has not been registered and is not seeking registration under any other GHG program</li> <li>• Projects not Rejected by Other GHG Programs</li> <li>• Declaration from PP confirming that the project is not claiming any other environmental credits other than VCUs</li> </ul>
/05/	The feasibility study report of the project dated 26/06/2021 (spread sheet on the survey done from 21/03/2021 to 16/06/2021)
/06/	<ul style="list-style-type: none"> <li>- Gas Safety rules</li> <li>- Gas distribution rules (Domestic) &amp; (Industry)</li> <li>- Gas Act</li> <li>- Gas distribution policy (others) &amp; (domestic)</li> <li>- Gas Marketing Law)</li> </ul>
/07/	Evidence for the start date of the project activity on June 1, 2022 (log of leak repairs)
/08/	Gas leak project agreement between Titas Gas Transmission & Distribution Co., Ltd. and Carbon Projects LLC, dated 25/10/2021
/09/	Training certificates for the project operation and maintenance team, dated 23/05/2022
/10/	The deed on the survey procedure, dated 17/05/2022
/11/	Map - Transmission & distribution pipeline
/12/	Declaration letter on the PSL staff trained on the Gas Surveyor and HFS, dated 01/06/2022
/13/	Organization structure
/14/	Lifetime of the repair materials used in the leak repair
/15/	Deed concerning calibration to perform the calibration of HFS
/16/	Technical specification of Hi-flow sampler; Instruction of operation & Maintenance on Natural Gas Leak Rate Measurement of Hi-Flow Sampler
/17/	Technical specifications of Gas Surveyor
/18/	Register on the complaints received, which also include complaints on leakage and the method of repairs carried out
/19/	<p>Evidence for determination of baseline scenario and demonstrate additionality including:</p> <ul style="list-style-type: none"> <li>- Investment barrier (cost for project implementation from third party Carbon Project Management and quotation from Heath Consultants for HFS and Gas surveyor</li> <li>- the technological barrier to prove additionality</li> <li>- (PD section 3.4: "Titas lacks the financial resources, technology, and training to undertake the kind of advanced leak detection and repair program proposed in the project")</li> <li>- Current practices exclude any kind of systematic leak detection or routine maintenance activity on above-ground infrastructure</li> <li>- Such support conditional to VCS registration is confirmed in the signed Project</li> </ul>

	Investment Agreement
/20/	Declaration from TGTDCI dated 06/06/2022 for the applicability conditions of the methodology AMO023, version 04 <ul style="list-style-type: none"> <li>- During the last three years prior to the implementation of the project activity, no advanced LDAR program was in place to address physical leakage from components that are included in the project boundary</li> <li>- New physical leaks that are detected at components during the crediting period (e.g., not at the time the project starts) are accountable only if the components were included in the project boundary at the validation of the project activity</li> <li>- Physical leaks that are detected and repaired under a conventional LDAR program are not covered in the project activity</li> <li>- Physical leaks that can be repaired by tightening/re-greasing or by similar measures are not covered in the project activity</li> <li>- Physical leaks that are identified on components where the latest scheduled maintenance or replacement was not done before the starting date of project activity as documented through maintenance logs, maintenance schedules, maintenance guidelines, worker logbooks, or other similar sources</li> </ul>
/21/	Leak detection and repair procedures within Titas Gas Transmission & Distribution Co., Ltd., 13/10/2021
/22/	Official letter regarding the project from the pipeline design department of Titas Gas Transmission & Distribution Co., Ltd., 06/06/2022
/23/	Operation & Maintenance log copies of gas distribution network during the recent three years
/24/	Certificate of Incorporation for Carbon Projects LLC (PP) and TGTDCI
/25/	Evidence related to local stakeholders meeting for the project activity (invitation, MOM, photos/videos, attendance, etc.)
/26/	Annual Report of Titas Gas Transmission & Distribution Co., Ltd. for the year 2019-20
/27/	Natural Gas Chemical Composition Report from Production & Marketing Division, Petrobangla
/28/	Technical standards for emergency gas leak repair are issued by both the Emergency Gas Control Section and System Operation Department of Titas Gas Transmission & Distribution Co., Ltd.

## APPENDIX 1.2: BACKGROUND DOCUMENTS

Ref	Document
/B01/	VCS Requirements <ol style="list-style-type: none"> <li>a. VCS Standard, version 4.3</li> <li>b. VCS Program Guide, version 4.2</li> <li>c. VCS Validation and Verification Manual, version 3.2</li> <li>d. Registration &amp; Issuance Process, version 4.2</li> <li>e. VCS Program Definitions version, version 4.2</li> <li>f. VCS PD template version 4.1</li> </ol>
/B02/	Applied baseline and monitoring methodology: AMO023, version 04, "Leak detection and repair in gas production, processing, transmission, storage and distribution systems and in refinery facilities"
/B03/	<ol style="list-style-type: none"> <li>a. "Standard for sampling and surveys for CDM project activities and programme of activities" (version 09.0)</li> <li>b. Guidelines for sampling and surveys for CDM project activities and Programme of Activities (version 04)</li> <li>c. "Combined tool to identify the baseline scenario and demonstrate additionality" version 07.0</li> <li>d. Guidelines for objective demonstration and assessment of barriers", version 01</li> </ol>
/B04/	Website and links: <ol style="list-style-type: none"> <li>1. <a href="http://cdm.unfccc.int">http://cdm.unfccc.int</a></li> </ol>


2. <a href="http://www.verra.org">http://www.verra.org</a>
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## APPENDIX 2: ABBREVIATIONS

<b>CDM</b>	Clean Development Mechanism
<b>BE</b>	Baseline Emission
<b>CAR</b>	Corrective Action Request
<b>CC IPL</b>	Carbon Check (India) Private Ltd.
<b>CDM</b>	Clean Development Mechanism
<b>CL</b>	Clarification Request
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>CO<sub>2e</sub></b>	Carbon Dioxide Equivalent
<b>DOE</b>	Designated Operational Entity
<b>DPR</b>	Detailed project report
<b>DVR</b>	Draft Validation Report
<b>EB</b>	CDM Executive Board
<b>EF</b>	Emission Factor
<b>ER</b>	Emission Reduction
<b>FAR</b>	Forward Action Request
<b>FVR</b>	Final validation Report
<b>GHG</b>	Greenhouse gas(es)
<b>GWh</b>	Giga Watt Hour
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>MW</b>	Mega Watt
<b>MWh</b>	Mega Watt Hour
<b>NA</b>	Not Applicable
<b>OSV</b>	On-Site Visit
<b>PD</b>	Project Description
<b>PP</b>	Project Proponent
<b>QC/QA</b>	Quality control/Quality assurance
<b>TGTDCL</b>	Titas Gas Transmission and Distribution Company Limited
<b>TR</b>	Technical Review
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>VCS</b>	Verified Carbon Standard
<b>VCSA</b>	Verified Carbon Standard Association
<b>VCU</b>	Verified Carbon Unit
<b>VVM</b>	Validation and Verification Manual
<b>VVS</b>	Validation and Verification Standard



## APPENDIX 3: CERTIFICATES OF COMPETENCE



# Carbon

CHECK

## Carbon Check (India) Private Ltd.

### Mr. Sanjay Agarwalla

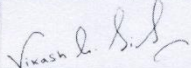
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*For following functions:*

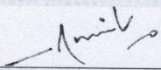
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Verifier	<input checked="" type="checkbox"/>	Technical Expert	<input checked="" type="checkbox"/>	Local Assessor <sup>1</sup>	<input checked="" type="checkbox"/>

*In the following Technical Areas:*

TA 1.1	<input checked="" type="checkbox"/>	TA 3.1	<input checked="" type="checkbox"/>	TA 5.2	<input checked="" type="checkbox"/>	TA 9.2	<input checked="" type="checkbox"/>	TA13.2	<input type="checkbox"/>
TA 1.2	<input checked="" type="checkbox"/>	TA 4.1	<input checked="" type="checkbox"/>	TA 8.1	<input type="checkbox"/>	TA 10.1	<input type="checkbox"/>	TA14.1	<input type="checkbox"/>
TA 2.1	<input checked="" type="checkbox"/>	TA 5.1	<input checked="" type="checkbox"/>	TA 9.1	<input checked="" type="checkbox"/>	TA 13.1	<input checked="" type="checkbox"/>		



**Mr. Vikash Kumar Singh**  
Compliance Officer



**Mr. Amit Anand**  
CEO

**Date of Approval**  
24/12/2021

**Valid Till**  
23/12/2022

**Revision History of the Document**

01/03/2020 <sup>2</sup>	Interim Revision for office address change
01/09/2020	Interim Revision for CCIPL logo change
24/12/2020	Annual Revision
24/12/2021	Annual Revision

<sup>1</sup> India

<sup>2</sup> Please refer to previous version of competency certificates for the revision history.

CARBON CHECK (INDIA) PRIVATE LIMITED  
**CIN: U74930DL2012PTC232495**  
**Regd. Off:** 2071/38, 2<sup>nd</sup> Floor, Naiwala, Karol Bagh, New Delhi - 110005  
**Corporate off:** Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh  
**Tel:** +91 120 4373114 | **URL:** [www.carboncheck.co.in](http://www.carboncheck.co.in) | **e-mail:** [info@carboncheck.co.in](mailto:info@carboncheck.co.in)



## Carbon Check (India) Private Ltd.

### Mr. Ramchandra Nesari

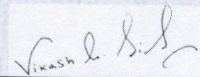
has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

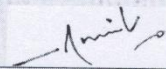
Validator  Team Leader  Technical reviewer   
 Verifier  Technical Expert  Local Assessor<sup>1</sup>

In the following Technical Areas:

TA 1.1  TA 4.1  TA 9.1  TA 13.1   
 TA 1.2  TA 5.1  TA 9.2  TA 13.2   
 TA 3.1  TA 5.2  TA 10.1  TA 14.1



Mr. Vikash Kumar Singh  
Compliance Officer



Mr. Amit Anand  
CEO

Date of Approval  
24/12/2021

Valid Till  
23/12/2022

#### Revision History of the Document

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<sup>1</sup> India

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CARBON CHECK (INDIA) PRIVATE LIMITED  
CIN: U74930DL2012PTC232495

Regd. Off: 2071/38, 2<sup>nd</sup> Floor, Naiwala, Karol Bagh, New Delhi - 110005

Corporate off: Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh  
Tel: +91 120 4373114 | URL: [www.carboncheck.co.in](http://www.carboncheck.co.in) | e-mail: [info@carboncheck.co.in](mailto:info@carboncheck.co.in)



## Carbon Check (India) Private Ltd.

### Vikas Vilasrao Bankar


has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator  Team Leader  Technical reviewer   
 Verifier  Technical Expert  Local Assessor<sup>1</sup>

In the following Technical Areas:

TA 1.1  TA 4.1  TA 9.1  TA 13.1   
 TA 1.2  TA 5.1  TA 9.2  TA 13.2   
 TA 3.1  TA 5.2  TA 10.1  TA 14.1



Mr. Vikash Kumar Singh  
Compliance Officer

**Date of Approval**  
24/12/2021



Mr. Amit Anand  
CEO

**Valid Till**  
23/12/2022

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<sup>1</sup> India.

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**CARBON CHECK (INDIA) PRIVATE LIMITED**  
CIN: U74930DL2012PTC232495

Regd. Off: 2071/38, 2<sup>nd</sup> Floor, Naiwala, Karol Bagh, New Delhi - 110005

Corporate off: Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh  
Tel: +91 120 4373114 | URL: [www.carboncheck.co.in](http://www.carboncheck.co.in) | e-mail: [info@carboncheck.co.in](mailto:info@carboncheck.co.in)



## Carbon Check (India) Private Ltd.

### Mr. SP Reddy

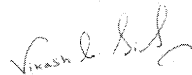
has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator  Team Leader  Technical reviewer   
 Verifier  Technical Expert  Local Assessor

In the following Technical Areas:

TA 1.1  TA 4.1  TA 9.1  TA 13.1   
 TA 1.2  TA 5.1  TA 9.2  TA 13.2   
 TA 3.1  TA 5.2  TA 10.1  TA 14.1



Mr. Vikash Kumar Singh  
Compliance Officer



Mr. Amit Anand  
CEO

Date of Approval  
24/12/2021

Valid Till  
23/12/2022

#### Revision History of the Document

01/03/2020 <sup>1</sup>	Interim Revision for office address change
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24/12/2020	Annual Revision
24/12/2021	Annual Revision

<sup>1</sup> Please refer to previous version of competency certificates for the revision history

## APPENDIX 4: FINDINGS LOG

Table 1. CLs from this Validation

Finding	CL 01		
<b>Classification</b>	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding (VVB)</b>	The values of the estimated ex-ante emission reductions do not match with the submitted ER spreadsheet. PP is requested to provide consistent documents along with the required supporting for the same.		
<b>Corrective Action or clarification #1</b> <i>(PP shall write a detailed and clear corrective action or further information for clarification as per finding)</i>	<i>The estimated emissions have been updated based on the most recent ER spreadsheet.</i>		
<b>VVB Assessment #1</b> <i>The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.</i>	PP has submitted a revised MR consistent with the ER spreadsheet. The CL is closed.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next periodic verification <input type="checkbox"/> Outstanding finding (not closed) <input checked="" type="checkbox"/> The finding is closed		

Finding	CL 02		
<b>Classification</b>	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding (VVB)</b>	The VCS ID reference number for the project has been incorrectly stated in section 1.12 of the PD.		
<b>Corrective Action or clarification #1</b> <i>(PP shall write a detailed and clear corrective action or further information for clarification as per finding)</i>	<i>The VCS ID has been updated.</i>		
<b>VVB Assessment #1</b> <i>The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.</i>	VCS ID reference has been corrected in the revised PD. The CL is closed.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next periodic verification <input type="checkbox"/> Outstanding finding (not closed) <input checked="" type="checkbox"/> The finding is closed		

Finding	CL 03		
<b>Classification</b>	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR

<b>Description of finding (VVB)</b>	PP is requested to update section 2.4 of the PD related to Public Comments as the period for comments is over now.
<b>Corrective Action or clarification #1</b> <i>(PP shall write a detailed and clear corrective action or further information for clarification as per finding)</i>	<i>Section 2.4 has been updated to indicate no comments were received during the public comment period.</i>
<b>VVB Assessment #1</b> <i>The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.</i>	PP has submitted a revised PD with appropriate corrections consider the GSC period is over and no comments were received. The CL is closed.
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next periodic verification <input type="checkbox"/> Outstanding finding (not closed) <input checked="" type="checkbox"/> The finding is closed

Finding	CL 04		
<b>Classification</b>	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding (VVB)</b>	The referred version of Guidelines on Common practice in the PD is not the latest one.		
<b>Corrective Action or clarification #1</b> <i>(PP shall write a detailed and clear corrective action or further information for clarification as per finding)</i>	<i>The reference has been updated to the latest version.</i>		
<b>VVB Assessment #1</b> <i>The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.</i>	In the submitted revised PD, latest version of the Guidelines on Common practice has been referred. The CL is closed.		
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next periodic verification <input type="checkbox"/> Outstanding finding (not closed) <input checked="" type="checkbox"/> The finding is closed		

Table 2. CARs from this Validation

Finding	CAR 01		
<b>Classification</b>	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR
<b>Description of finding (VVB)</b>	As per section 3.16.1 of VCS Standard, version 4.2:  <i>“The project proponent shall demonstrate how the project activities, or additional activities implemented by the project proponent, contribute to sustainable development, as defined by and tracked against the United Nations Sustainable Development Goals (SDGs). The project proponent must demonstrate that a project contributes to at least three SDGs by the end of the first monitoring period, and in each subsequent monitoring period”.</i>		

	This is missing in the PD.
<b>Corrective Action or clarification #1</b> <i>(PP shall write a detailed and clear corrective action or further information for clarification as per finding)</i>	The SDG Goals that the project anticipates reaching have been updated using the latest estimates from the ER Excel sheet and based on the actual employment information.
<b>VVB Assessment #1</b> <i>The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.</i>	PP has submitted a revised PD stating the SDG goals. The CAR is closed.
<b>Conclusion</b> <i>Tick the appropriate checkbox</i>	<input type="checkbox"/> To be checked during the next periodic verification <input type="checkbox"/> Outstanding finding (not closed) <input checked="" type="checkbox"/> The finding is closed