




**Validation report form for
CDM project activities
(Version 04.0)**

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION

Title of the project activity	Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman
Scale of the project activity	<input checked="" type="checkbox"/> Large-scale <input type="checkbox"/> Small-scale
Version number of the validation report	03
Completion date of the validation report	03/08/2020
Version number of the PDD to which this report applies	03.0
Date when PDD was uploaded for global stakeholder consultation	03/07/2020
Project participants	The Government of the Sultanate of Oman, represented by the Ministry of Oil & Gas
Host Party	The Sultanate of Oman
Applied methodologies and standardized baselines	Methodology: AM0009 (Version 07.0) Recovery and utilization of gas from oil fields that would otherwise be flared or vented
Mandatory sectoral scopes	Sectoral Scope 10: Fugitive emissions from fuels (solid, oil and gas)
Conditional sectoral scopes, if applicable	-
Estimated amount of annual average GHG emission reductions or GHG removals by sinks	432,416 tCO ₂ e
Name and UNFCCC reference number of the DOE	Shenzhen CTI International Certification Co., Ltd (CTI) (UNFCCC Registration No.:E-0061)
Name, position and signature of the approver of the validation report	Mr. Zhoulu, General Manager 

SECTION A. Executive summary

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The organization The Government of the Sultanate of Oman, represented by the Ministry of Oil & Gas has commissioned the DOE CTI Certification to perform a validation of the CDM Project Activity “Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman” in The Sultanate of Oman (hereafter called “the project”). This report summarizes the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. The term “UNFCCC criteria” refers to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

The proposed project is a newly built associated gas recovery and processing project located at Khamilah oil field at Block-27, Wilayat Ibri of Al- Dhahirah Governorate, the Sultanate of Oman. The recovered associated gas from at Khamilah oil field area at Block-27 will be collected and processed at Khamilah station. Approximate coordinates of Khamilah station are east longitude of 56°14'38" and north latitude of 22°43'01". The proposed project is operated by Occidental of Oman Inc. under a development and production sharing agreement with the Ministry of Oil and Gas. The purpose of the project activity is to deliver recovered gas to the national gas pipeline to meet energy needs of end-users, and also to reduce local air pollution due to flaring. The total estimated amount of associated gas to be recovered during crediting period is about 2.01 billion Nm³ while average methane content is estimated at about 78%. The project activity is expected to reduce emissions by approximately 432,416tonnes of CO₂ equivalent annually over the crediting period.

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

Scope of Validation:

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the relevant criteria and decisions by the CDM Executive Board, including the approved baseline and monitoring methodology. The validation team has, based on the recommendations in the Validation and Verification Standard employed (latest version) a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

Validation process:

CTI assessed and determined whether the proposed implementation and operation of the project activity, and the steps taken to report emission reductions comply with the requirements specified in the CDM M&P, the CDM Validation and Verification Standard for project activity, version 02.0, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques. The validation process consists of the following three phases

- Document review: Desk review of the CDM PDD, and other relevant documents
- On site visit and follow-up interviews with project stakeholders
- The resolution of outstanding issues and the issuance of the final validation report.

Conclusion:

By validation as below, CTI concludes that the CDM Project Activity “Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman” in The Sultanate of Oman, as described in the PDD (Version 03.0), meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board.

SECTION B. Validation team, technical reviewer and approver

B.1. Validation team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Validation findings
1.	Team Leader	EI	Huang	Peter	Shenzhen	√	√	√	√

B.2. Technical reviewer and approver of the validation report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Lin	Wu	Shenzhen

SECTION C. Means of validation

C.1. Desk/document review

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The PDD and additional background documents related to the project design and baseline were submitted to the validation team for review. The document review in particular includes applicability of selected methodology, baseline determination, additionality of project activity, monitoring plan, emission reduction calculations. All documentations that were reviewed during the validation can be found in Appendix 3 of this validation report.

C.2. On-site inspection

The PDD version 1.0 dated 28/11/2019 was made publicly available by CTI on the CDM website. During the global stakeholder consultation period, no comments regarding this project were received. The PDD version 1.0 dated 28/11/2019 was withdrawn on 01/07/2020 due to the change of PP for which CTI has a contractual obligation.

Following the withdrawal, the PDD version 2.0 dated 02/07/2020 was made publicly available by CTI on the CDM website. The PDD version 2.0 corrected the typo errors in PDD version 1.0 such as the recovered gas volume, emission reduction volumes, etc and revised the project participant. The project title was updated as per the LoA issued by Ministry of Environment & Climate Affairs of the Sultanate of Oman/5/. The detail information for the global stakeholder consultation has been displayed in Section D12 of the validation report.

After the comment period was over on 29/12/2019 for the publication of the PDD version 1.0 dated 28/11/2019, validation site visit was performed on 08/01/2020 to 09/01/2020. CTI didn't perform a second validation site visit after the publication of PDD, version 2.0 dated 02/07/2020, as there is no change to design of project activity, and CTI confirms that the site visit was performed on 08/01/2020 to 09/01/2020 has covered all the subject for validation.

Duration of on-site inspection: 08/01/2020 to 09/01/2020				
No.	Activity performed on-site	Site location	Date	Team member
1.	On-site inspection of installed equipment and applied technology by the proposed project activity	Khamilah station, Block-27 in Wilayata Ibri of the Sultanate of Oman	08/01/2020	Peter Huang
2.	Document review and key staff interview	Khamilah station, Block-27 in Wilayata Ibri of the Sultanate of Oman	08/01/2020-09/01/2020	Peter Huang

C.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Al Salmani	Saif	Ministry of Oil & Gas	08/01/2020 - 09/01/2020	- PP's background - Project implementation - Technical design - CDM consideration	Peter Huang

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
2.	Al Maawali	Said	OQ Trading Limited	08/01/2020 - 09/01/2020	<ul style="list-style-type: none"> - Project approval - Impacts on local economic, society and sustainable development - Preferential policy - Financial subsidy - Environmental impacts - Mitigation measures - Environmental approval - Job opportunities - stakeholder comments - Social and environmental impact of the project 	Peter Huang
3.	Al Ghassani	Ghassan	Occidental of Oman Inc.	08/01/2020 - 09/01/2020		Peter Huang
4.	Li	Ning	Carbon Resource Management S.A.	08/01/2020 - 09/01/2020	<ul style="list-style-type: none"> - Project design - Applicability of the selected methodology - Baseline identification - ER calculation - Additionality issues - Monitoring Plan 	Peter Huang

C.4. Sampling approach

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Not applicable for this proposed project.

C.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Demonstration of prior consideration of the CDM	0	1	0
Identification of project type	0	0	0
Description of project activity	1	0	0
Application and selection of methodologies and standardized baselines	0	0	0
- Application of methodologies and standardized baselines	0	0	0
- Deviation from methodology and/or methodological tool	0	0	0
- Clarification on applicability of methodology, tool and/or standardized baseline	0	0	0
- Project boundary, sources and GHGs	0	0	0
- Baseline scenario	1	0	0
- Demonstration of additionality	0	3	0
- Estimation of emission reductions or net anthropogenic removals	0	0	0
- Monitoring plan	1	0	0
Start date, crediting period type and duration	0	0	0
Environmental impacts	0	0	0
Local stakeholder consultation	0	0	0
Sustainable development co-benefits	0	0	0

Approval	0	0	0
Authorization	0	1	0
Modalities of communication	0	1	0
Global stakeholder consultation	0	0	0
Others (please specify)	0	0	0
Total	3	6	0

SECTION D. Validation findings

D.1. Demonstration of prior consideration of the CDM

Means of validation	<p>The starting date of the project activity is determined as the date when the Purchase agreement of Gas Compressor, Motor and Process Air Cooler for Block-27 /31/ was signed, which was on 06/05/2019. It is confirmed by the validation team to be the earliest of the dates at which the implementation or construction or real action of the project activity in accordance with the latest “Glossary: CDM terms”/19/. By referring to CDM Project Activity Prior Consideration Form/39/, the list of prior consideration notifications from the UNFCCC CDM website/52/, and communication between the project participants, it is confirmed by the validation team that the prior consideration form was accepted by The Sultanate of Oman DNA and EB on 29/09/2019. The starting date of the project activity is after 02/08/2008, 2 months after the investment decision/24/, validation team confirms the notification on 29/09/2019 was done within 180 days of the start date of this project activity.</p> <p>The validation team confirms th.at the start date is the first real action that was taken where the PP committed to expenditure according to the “Glossary: CDM terms”. In order to corroborate this information, the validation team has reviewed the following key milestone events and related documents:</p> <table border="1" data-bbox="448 1037 1437 2029"> <thead> <tr> <th>date</th><th>Timeline</th></tr> </thead> <tbody> <tr> <td>05/03/2019</td><td>Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman (investment decision), the project participant and the operator concluded that the proposed project activity is not financially attractive without the carbon revenue, and the PP will secure to carbon revenue to overcome the financial barrier and register the project as CDM project at UNFCCC</td></tr> <tr> <td>28/03/2019</td><td>Carbon Asset Development Agreement (CADA), the project participants agreed to cooperate with Carbon Resource Management S.A. in developing the Project as a CDM project</td></tr> <tr> <td>06/05/2019</td><td>Purchase agreement of gas compressor, motor and process air cooler for Block-27 (start date)</td></tr> <tr> <td>02/06/2019</td><td>The notification letter issued from the construction company to the project participant (construction started)</td></tr> <tr> <td>Jul 2019</td><td>Carbon Resource Management S.A. (the CDM consultant) performed site visit for information exchange, carbon communications and CDM training for the project participant</td></tr> <tr> <td>29/09/2019</td><td>Inform the host Party's DNA and the UNFCCC secretariat with notification about the commencement and their intention to seek the CDM status for the project activity.</td></tr> <tr> <td>30/11/2019-29/12/2019</td><td>PDD publication for the global stakeholder consultation (withdraw 01/07/2020 because of the changing of project participant having contractual obligation with CTI)</td></tr> <tr> <td>05/01/2020</td><td>Completion of the project</td></tr> <tr> <td>03/07/2020-01/08/2020</td><td>PDD publication for the global stakeholder consultation</td></tr> </tbody> </table>	date	Timeline	05/03/2019	Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman (investment decision), the project participant and the operator concluded that the proposed project activity is not financially attractive without the carbon revenue, and the PP will secure to carbon revenue to overcome the financial barrier and register the project as CDM project at UNFCCC	28/03/2019	Carbon Asset Development Agreement (CADA), the project participants agreed to cooperate with Carbon Resource Management S.A. in developing the Project as a CDM project	06/05/2019	Purchase agreement of gas compressor, motor and process air cooler for Block-27 (start date)	02/06/2019	The notification letter issued from the construction company to the project participant (construction started)	Jul 2019	Carbon Resource Management S.A. (the CDM consultant) performed site visit for information exchange, carbon communications and CDM training for the project participant	29/09/2019	Inform the host Party's DNA and the UNFCCC secretariat with notification about the commencement and their intention to seek the CDM status for the project activity.	30/11/2019-29/12/2019	PDD publication for the global stakeholder consultation (withdraw 01/07/2020 because of the changing of project participant having contractual obligation with CTI)	05/01/2020	Completion of the project	03/07/2020-01/08/2020	PDD publication for the global stakeholder consultation
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	Thus, the validation team confirmed that the CDM was seriously and continuously considered in the decision to implement the project activity as per the requirements for prior consideration of the CDM contained in the VVS/8/, CDM Project Standard/9/ and the CDM Project Cycle Procedure/10/.
Findings	CAR 1: The proposed project activity with a start date of 06/05/2019, which is prior to the date of PDD publication for global stakeholder consultation on 30/11/2019. The project participants are requested to demonstrate that the CDM was seriously considered in the decision to implement the project activity as per CDM project standard for project activities version 02.0. In doing so, please provide: a) evidence of their awareness of the CDM prior to the start date of the project activity, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project activity; b) evidence that continuing and real actions were taken to secure the CDM status for the project activity in parallel with its implementation, c) an implementation timeline of the project activity.
Conclusion	Refer to CAR 1 as above, it is responded satisfactorily as detailed in the below Appendix 4 of the report. CAR 1 is closed. The CDM was seriously considered by the PP. The evidences were transparently reviewed by the validation team and considered to be effective. It is therefore concluded that CDM benefits were considered necessary by PP in the decision to undertake the project as a proposed CDM project activity, real and continuing actions were taken to secure the CDM status for the project activity in parallel with its implementation.

D.2. Identification of project type

Means of validation	The proposed project activity results in average GHG emission reductions of 432,416 tCO ₂ e annually, which is exceeding the threshold capacity of small-scale project activity (60 kilotonnes of carbon dioxide equivalent annually). Thus, the project is correctly identified as large-scale project activity. The PDD has been completed using the latest and valid version of PDD form and following instructions.
Findings	No non-conformability was observed during assessment. Therefore, no finding was raised.
Conclusion	CTI is of the opinion that, in line CDM modalities and procedure, the project type is correctly identified as large-scale project activity which is outlined in paragraph 34 of the project standard for project activities version 02.0. It is also confirmed that the valid version of the PDD form has been used to complete the PDD following instructions therein.

D.3. Description of project activity

Means of validation	<p>The validation means, which includes documentation review, on-site observation, follow-up interview and background investigation on the internet, have been used to ensure the description of the project is accurate and complete.</p> <p>By checking the environment permit, it is confirmed that the project is a newly-built associated gas recovery and processing project, the proposed project activity is to recovery and utilization of natural gas found in association with oil at Khamilah oil field at Block-27, Wilayat Ibri of Al- Dhahirah Governorate, the Sultanate of Oman. The proposed project is operated by Occidental of Oman Inc. under a development and production sharing agreement with the Ministry of Oil and Gas/47/ and Gas sales and purchase agreement (GSPA)/45/. The purpose of the project activity is to deliver recovered gas to the national gas pipeline to meet energy needs of end-users, and also to reduce local air pollution due to flaring. Therefore, the project will contribute to local sustainable development, which was demonstrated in the LoA issued by the CDM-DNA of the Sultanate of Oman/5/.</p> <p>According to the on-site communication with the project owner and the technical specifications/29/, it is confirmed that the recovery process of the proposed project comprises three main stages: the separation stage, the compression stage and the processing stage, and the main project activities include the installation of compressor packages at Khamilah oil field area at Block-27, including compressor, motor, scrubbers, suction and discharge bottles, coolers, as well as installation of a</p>
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	<p>pipeline network. Technology employed by the proposed project activity consists of reduction of the flare by a series of new pipelines and re-routes, electrical motor driven reciprocating compressor as well as electrical infrastructures including transformers and relays to support the high voltage and low voltage demands of the compressor. According to manufacturer specifications/29/, compressors lifetime is 10 years for products properly maintained and used according to instructions.</p> <p>The proposed project activity will collect associated gas from Khamilah oil field area at Block-27, Wilayat Ibri of Al- Dhahirah Governorate, the Sultanate of Oman. The recovered gas will be collected and processed at Khamilah station. Approximate geographical coordinates of Khamilah station are 56°14'38"E, 22°43'01"N. CTI performed an on-site inspection to the proposed project from 08/01/2020 to 09/01/2020 and confirmed that the location described in the PDD is accurate.</p> <p>By means of on-site inspection and document review, the validation team confirmed that the project pipeline system are clearly illustrated, the detailed information of the installations, technologies employed by the proposed project activity correctly presented in section A in PDD.</p> <p>The Khamilah oil field area at Block-27 produces oil before and after the project activity, the oil production process will remain unchanged. The scenario existing prior to the start of the implementation of the proposed project activity is that associated gas is flared on site, the existing oil and gas infrastructure operates without processing of any recovered associated gas and gas-lift gas from the same source and quantity as under the project activity is used in the gas-lift system. Non-associated gas or other fossil sources is combusted to meet energy needs of end-users in Oman. The baseline scenario is the same as the scenario existing prior to the start of implementation of the proposed project activity.</p> <p>Baseline emissions source include CO₂ emissions from combustion of fossil fuels at end-users that are produced from non-associated gas and other fossil sources, and project emissions sources comprise CO₂ emissions from energy use for the recovery, pre-treatment including compression of the recovered gas.</p> <p>During the on-site inspection, CTI has verified the Statement gas and gains/36/, and confirmed the expected annual gross gas volumes to be recovered as part of the project activity are on average 8,106.8 mmscf over its lifetime. On average about 312.4 mmscf of the recovered gas will be used annually in captive power plant on-site to supply electricity to the project activity. The captive gas power plant is operated by on-site operator and the gas is delivered free of charge to the power plant. Expected average net gas volumes delivered to National pipeline is 7,482.7mmscf after deduction of onsite gas consumption due to project activity and deduction of a shrinkage factor due to gas treatment at gas plant for the purpose of meeting the specifications of the National pipeline¹. The pipeline transportation capacity is more than 1 million Nm³ of gas per day/29/.</p> <p>The project reduces greenhouse gases emissions as the utilization of recovered gas displaces the use of non associated gas or other fossil sources at end-users. The total estimated amount of associated gas to be recovered during crediting period is about 2.01 billion Nm³ while average methane content is estimated at about 78% based on the gas analysis report/40/. The designed lifetime of the main equipment, i.e. project compressor is 10 years as per the manufacturer specifications/29/. Thus, PP selected a fixed 10-year crediting period has been chosen, starting from 05/08/2020 or the date of registration, whichever is earlier. The emission reductions are estimated to be average 432,416 tCO₂/year and total 4,324,161 tCO₂e over the crediting period.</p>
Findings	CL 1: It is requested to provide a figure to illustrate the project pipeline system, and describe the detailed information of the installations, technologies employed by the

¹ Expected average net gas volumes= (expected gross gas volumes- projected quantity of gas used internally)*(100%- shrinkage factor). The calculation was performed on yearly basis, and year average data is calculated as the arithmetic mean over the 10 years of the project lifetime.

	proposed project activity in section A.4.3 in PDD.
Conclusion	<p>Refer to CL 1 as above, it is responded satisfactorily as detailed in the below Appendix 4 of the report. Therefore, CL 1 is closed.</p> <p>CTI validation team considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant methodology, tools, forms and guidance at the time of PDD submission for registration.</p>

D.4. Application and selection of methodologies and standardized baselines

D.4.1. Application of methodologies and standardized baselines

Means of validation	The project applies the approved baseline methodology AM0009 (Version 07.0), titled "Recovery and utilization of gas from oil fields that would otherwise be flared or vented". For each applicability, the proposed project is justified according to applicability of AM0009 and applied methodology tools.		
	Applicability requirements	Criteria fulfilled	Justification
	<p>The methodology is applicable to project activities that recover and utilize the associated gas and/or gas-lift gas from oil fields that would have been either vented or flared in the absence of the project activity. The recovery may include the pre-treatment (compression and phase separation) in mobile or stationary equipment.</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p>It is confirmed based on the site visit that prior to the start of the project activity, part of the associated gas was used for the purpose of the gas-lift process and excess associated gas was flared on-site. The proposed project activity aims to recover and utilise associated gas from oil wells that would have been flared in the absence of the project activity.</p> <p>The recovery includes the pre-treatment (compression and phase separation) in or stationary equipment. Thus, it is applicable.</p>
	<p>The methodology is applicable under the following conditions: (a) Under the project activity the recovered gas is transported to a gas pipeline with or without prior processing. Prior processing may include transportation to a processing plant where the recovered gas is processed into hydrocarbon products (e.g. dry gas, liquefied petroleum gas (LPG)). The dry natural gas is either: (i) transported to a gas pipeline directly; or (ii) compressed to CNG first, then transported by trailers/trucks/carriers and then decompressed again; and/or (b) All recovered gas comes from oil wells that are in operation and are producing oil at the time of the recovery of the associated gas and/or gas-lift</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<p>It is confirmed based on the on-site observation and communication with the project owner, the gas will be transported to a processing plant and processed into hydrocarbon products (dry gas and condensate). The dry gas will be transported to a gas pipeline directly.</p> <p>This situation belongs to category (a) and (a)-(i) of this requirement; Thus, category (a) is applicable.</p> <p>Through the on-site interview with the technical staff, the validation team confirmed that the oil wells in Khamilah oil field area at Block-27 will continue to be in operation and producing oil till 2044, therefore, at the time of the recovery of the associated gas and/or gas-lift gas, all recovered</p>

	<p>gas; (c) Partial amount of the associated gas and/or gas-lift gas can be used on-site to meet on-site energy demands, i.e. to run auxiliary equipment prior to the implementation of the project activity and after the implementation of the project activity.</p>		<p>gas comes from oil wells that are in operation and are producing oil. Thus, category (b) is applicable.</p> <p>A small amount of recovered associated gas will be consumed on-site for electricity generation to meet energy demands of the proposed project activity after the implementation of the project activity, which was confirmed through the on-site interview and by checking Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman/24/. Thus, category (c) is applicable.</p> <p>Therefore, it is applicable.</p>
	<p>In addition, the applicability conditions included in the tools referred to above apply.</p> <p>(b) Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)</p> <p>(c) Methodological tool: Tool for the demonstration and assessment of additionality (Version 07.0)</p> <p>(d) Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<p>The application is justified as below:</p> <p>(b) It is confirmed based on the on-site inspection the proposed project activity will consume electricity from (an) off-grid fossil fuel fired captive power plant(s), and no captive renewable power generation technologies involved;</p> <p>(c) The application by project participants using this methodology is mandatory by the applied methodology.</p> <p>(d) The application by project participants using this methodology is mandatory by the applied methodology. As discussed above, the tools are all applicable.</p>
	<p>Finally, this methodology is only applicable if the application of the procedure to identify the baseline scenario and demonstrate additionality results in the venting and/or flaring of the associated gas and/or gas-lift gas at the oil production facility as the most plausible baseline scenario.</p>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<p>As identified and demonstrated in section B.4 and B.5 of PDD, the most plausible baseline scenario is the flaring of the associated gas at the oil production facility. Thus, it is applicable.</p>
Findings	N/A.		
Conclusion	The assessment of applicability conditions of the project is compliance with the applicability criteria of the methodology AM0009 (Version 07.0) as documented in the PDD Section B.		

D.4.2. Deviation from methodology and/or methodological tool

Means of validation	N/A
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Findings	N/A
Conclusion	N/A

D.4.3. Clarification on applicability of methodology, tool and/or standardized baseline

Means of validation	N/A
Findings	N/A
Conclusion	N/A

D.4.4. Project boundary, sources and GHGs

Means of validation	<p>CTI validates the project boundary by means of documents review, physical site inspection (one location) and interview with key staff.</p> <p>The spatial extent of the project boundary is clearly defined as per AM0009 version 07.0 as:</p> <ul style="list-style-type: none"> • the project oil reservoir and oil wells at Khamilah oil field at Block-27, where the associated gas is collected; • the site where the associated gas was flared in the absence of the project activity; • the gas recovery, pre-treatment, processing and transportation infrastructures and compressors; • the source of gas-lift gas. <p>The project boundary delineated in the PDD Figure B.1 complies with AM0009 Version 07.0. On-site gas consumption is included in the project boundary as this is the own needs of gas pre-treatment and inter-site transportation. Based on the above assessment, CTI hereby confirms that the identified boundary and the selected sources and gases are justified for the project activity.</p> <p>The identified boundary and the selected sinks and sources of greenhouse gases have been justified for the project activity in the PDD according to the applied methodology AM0009 Version 07.0.</p>		
	Emissions	GHGs involved	Justification/Explanation
	Baseline emissions	CO ₂	Main source of emissions in the baseline. It is confirmed during the on-site visit, the project activity will recover the associated gas from at Khamilah oil field area at Block-27 that would have been flared in the absence of the project activity, to displace the use of other fossil fuel sources. And other sources of emissions are excluded for simplification, which is conservative, as per methodology AM0009 version 07 applied.
	Project emissions	CO ₂	Main source of emissions in the proposed project activity. As confirmed by the on-site visit, the main source of the project emissions from the proposed project activity is caused by the use of electricity for the recovery, pre-treatment, transportation, and compression of the recovered gas up to the point F in Figure 2 in applied methodology AM0009 version 07. The project activity does not involve the project emissions due to consumption of fossil fuels. And other sources of emissions are excluded for simplification, and assumed to be negligible as per methodology AM0009 version 07.
Findings	No non-conformability was observed during assessment. Therefore, no finding was raised.		
Conclusion	In summary, the project boundary was correctly identified in accordance with the methodology AM0009 (Version 07.0). All greenhouse gas emissions occurring		

within the proposed project activity boundary as a result of the implementation of the proposed CDM project activity have been appropriately addressed in the PDD.

D.4.5. Baseline scenario

Means of validation	According to applied methodology AM0009 version 07.0, the baseline scenario is the same as the scenario existing prior to the start of implementation of the proposed project activity. The project reduces greenhouse gases emissions as the utilization of recovered gas displaces the use of non associated gas or other fossil sources at end users.		
	In accordance with AM0009 version 07.0, the project participants applied <u>step 1</u> of the “Combined tool to identify the baseline scenario and demonstrate additionality” version 07.0 together with the additional guidance contained in applied methodology AM0009 Version 07.0 to identify the baseline scenario and demonstrate the additionality.		
	As described in PDD Section B.4, at <u>Step 1a</u> all realistic and credible baseline scenarios were identified and assessed for plausibility.		
	<u>Step 1a: Define alternative scenarios to the proposed CDM project activity</u>		
	Scenarios as per AM0009 version 7.0	Scenario applicability as provided by Project participant	Means of Validation
	S1: The proposed project activity undertaken without being registered as a CDM project activity.	Plausible. It is technically and legally possible but economically unattractive as shown in section D.4.6 below.	The alternative S1 faces financial barrier, which is discussed in section D.4.6 of this report. Hence, due to existence of barrier, the alternative S1 is not considered for further analysis.
	S2: Where applicable, no investment is undertaken by the project participants, i.e., the same output as that produced by the proposed CDM project activity can also be provided by others than the project proponent (i.e., the PP is not the only output provider). For example: (i) In the case of a Greenfield power project, an alternative scenario may be that the project participants would not invest in the Greenfield power plant but that power would be generated in existing and/or new power plants in the electricity grid; (ii) In the case of a transportation project, an alternative scenario may be that the project participants would not invest in alternative	Not Plausible If no investment is taken by the PP, in this particular scenario, no third party will invest in the similar kind activities with the same output as the oil wells are owned and managed by the project owner only.	The oil wells are owned and managed by the PP, so a third party investment for the proposed project cannot be considered a plausible alternative.

	<p>modes (e.g. rail or pipelines), but these alternatives would be implemented by third parties.</p>		
	<p>S3: Where applicable, the continuation of the current situation, not requiring any investment or expenses to maintain the current situation, such as, inter alia:</p> <ul style="list-style-type: none"> (i) The continued venting of methane from a landfill; (ii) The continued release of N₂O from adipic or nitric acid production. <p>As per the applicable methodology para 19 (b), venting and/or flaring of the associated gas and/or gas-lift gas at the oil production facility.</p>	<p>Plausible</p> <p>Prior to the project, part of the associated gas was used for the purpose of the gas-lift process and excess associated gas was flared on-site. There is no local or national regulation in Oman that restricts from flaring the gas.</p> <p>In this scenario, gas from the same source as under the project activity and in the same quantity as under the project activity is used for the gas-lift system, the injection of gas into the oil reservoir and its production process for the purpose of the gas-lift process is common production. Gas used as gas-lift gas originates from the wells where it is re-injected, while volumes of gas required for gas-lift process are calculated by field operator for efficient oil production.</p> <p>S3 is the scenario existing prior to the start of the implementation of the project activity and it is the baseline scenario of the project activity.</p>	<p>Based on the on-site inspection and the interview with project owner, prior to the project, part of the associated gas was used for the purpose of the gas-lift process and excess gas was flared on-site. There is no local or national regulation in Oman that restricts from flaring the gas. A World Bank Report/26/ shows that It's common situation that the associated gas is flared in Oman.</p> <p>Through the on-site observation and interview with the technical staff, in this scenario, gas from the same source as under the project activity and in the same quantity as under the project activity is used for the gas-lift system, the injection of gas into the oil reservoir and its production process for the purpose of the gas-lift process is common production. S3 is the scenario existing prior to the start of the implementation of the project activity and it is the baseline scenario of the project activity</p>
	<p>S4: Where applicable, the continuation of the current situation, requiring an investment or expenses to maintain the current situation, such as, inter alia:</p> <ul style="list-style-type: none"> (i) The continued use of an existing boiler involving expenses for operation and maintenance; (ii) The continued use of a specific fuel mix for power generation in an existing power plant; (iii) The continued 	<p>Not Plausible</p> <p>No investment is required for the current situation as the gas is being flared.</p>	<p>Through the on-site observation and interview with the technical staff, it is confirmed the project participant does not require any investment to maintain the situation ie. flaring of the associated gas. Hence this is not considered as plausible alternative.</p>

	use of existing transportation infrastructure for transporting a product.		
	<p>S5: Other plausible and credible alternative scenarios to the project activity scenario, including the common practices in the relevant sector, which deliver the same output considering examples of scenarios identified in the underlying methodology where relevant;</p> <p>As per the applicable methodology para 19 (c), All other plausible and credible alternatives to the project activity. Such alternatives may include, for example, recovery and use of the associated gas and/or gas-lift gas:</p> <p>(i) In chemical industry;</p> <p>(ii) To produce heat and/or electricity;</p> <p>(iii) To use on-site.</p>	<p>Not Plausible.</p> <p><i>(i) In chemical industry;</i> A chemical industry tends to require large investments and a stable gas supply. However, the associated gas from the proposed project will decrease year by year and does not guarantee such a stable and long-lasting supply. Besides, there is no manufacturing industry near project location. This Scenario is not considered a plausible alternative</p> <p><i>(ii) To produce heat and/or electricity;</i> It is not common practice in the oil and gas sector to produce heat and/or electricity with associated gas in Oman, the detailed common practice analysis is provided in Section B.5. The electricity used for the oil wells in Oman are from non-associated gas and other fossil sources in power generation. The gas has been flared in the baseline situation. This Scenario is not considered a plausible alternative.</p> <p><i>(iii) To use on-site.</i> On-site use of the associated gas is not a common practice in the oil and gas sector in Oman, as flaring of the associated gas is legally allowed. This Scenario is not considered a plausible alternative</p>	<p>Based on the on-site inspection and the interview with project owner, the proposed project activity is located in the middle of the Omani desert on an existing oil field, there is no manufacturing industry near project location. Furthermore, the associated gas from the proposed project will decrease year by year according to statement gas and gains/36/ and will not be a stable and long-lasting supply for chemical industry.</p> <p>The recovery of flared gas to produce heat and/or electricity is not a common practice in the oil fields in the host country as confirmed by the technical staff as well as by the project owner during site visit. In absent of the project, the electricity used for the oil wells in Oman is generated by non-associated gas and other fossil sources, and there is no requirement of heat at the project site, which was confirmed by the validation team through the on-site observation and interview with the technical staff.</p> <p>It is also confirmed that on-site use of the associated gas is not a common practice in the oil and gas sector in Oman, as flaring of the associated gas is legally allowed.</p>
	S6: Where applicable, the “proposed project activity undertaken without being registered	Not Plausible The proposed project activity without being registered as CDM	There is no exiting regulations which prevents the installation of project activity as

	<p>as a CDM project activity" to be implemented at a later point in time (e.g. due to existing regulations, end-of-life of existing equipment, financing aspects)</p> <p>project activity is not being implemented under any existing regulation. There is no legislation that mandates the Project Participants to recover the associated gas.</p> <p>The proposed project activity is also not being implemented due to end-of life of existing equipment as it is greenfield project and no equipments exist.</p> <p>confirmed by the local and technical expert and neither due to end of life of existing system. Hence this is not a plausible alternative</p>
	<p>Outcome of step 1a: Scenario S1 and Scenario S3 are plausible.</p> <p>Step 1b: Consistency with mandatory applicable laws and regulations</p> <p>The validation team has checked the report "Regulation of Associated Gas Flaring and Venting, A Global Overview and Lessons from International Experience" published by the Global Gas Flaring Reduction Public-Private Partnership of the World Bank/21/, which states that the operator may "lift, process, and market associated gas jointly with the national oil company, subject to a negotiated gas agreement" and "use associated gas in operations or re-inject or flare gas, subject to relevant consents". The report also indicates that: "Permission to flare gas that cannot be marketed and that exceeds operational requirements is granted by the minister's written consent. Permission is not required to flare during normal well testing". Thus, no laws or regulations restrict Scenario (a) and Scenario (b).</p> <p>In addition, on the basis of the environmental permit issued on 03/09/2018 /30/ by Ministry of Environment and Climate Affairs according to Law on Conservation of Environment and Prevention of Pollution promulgated by Royal Decree/23//25/, the associated gas flaring at Block-27 (existing scenario prior to the proposed project activity) does not violate the emissions standards as prescribed by the Ministerial Decision 5/86/23/. Therefore, CTI confirms that Scenario (a) and Scenario (b) are consistency with the mandatory applicable laws and regulations.</p> <p>Outcome of step 1b: Scenario (a) and Scenario (b) are plausible.</p> <p>Conclusion of step 1: Scenario (a) and Scenario (b) are plausible and both discussed further in section D.4.6 below. As detailed in section D.4.6 below, the outcome of the investment analysis shows that Scenario (a) above (i.e. The project activity not implemented as a CDM project) is not considered economically attractive by the project participants. Therefore, the most plausible baseline scenario for the proposed project is identified as Scenario (b), Venting and/or flaring of the associated gas and/or gas-lift gas at the oil production facility.</p> <p>Outcome of Step 1: Scenario (a) and Scenario (b) are plausible and both discussed further in section B.5 in PDD (section D.4.6 in this report below).</p> <p>All the realistic and credible alternative scenarios outlined above are in compliance with mandatory legislation and regulations taking into account the enforcement in Oman and EB decisions on national and/or sectoral policies and regulations.</p>
Findings	<p>CL 2: Project participants are requested to follow the requirements of sub-steps in step 1 of the "Combined tool to identify the baseline scenario and demonstrate additionality" version 07.0, to list all plausible alternative scenarios to the proposed project activity, and then analysis the consistency with mandatory applicable laws and regulations.</p>

Conclusion	<p>Refer to CL2 as above, it is responded satisfactorily as detailed in the below Appendix 4 of the report. Therefore, CL 2 is closed.</p> <p>The scenario existing prior to the start of the implementation of the proposed project activity is flaring of associated gas at the oil production site, the operation of the existing oil and gas infrastructure without processing of any recovered associated gas, and the use of gas-lift gas from the same source and quantity as under the project activity in the gas-lift system. The baseline scenario is the same as the scenario existing prior to the start of implementation of the proposed project activity.</p> <p>Based on information in the PDD, supporting documentation, referred sources and review of similar CDM projects, CTI confirms that the approved baseline methodology has been correctly applied for baseline identification. The PDD provides a verifiable description of the identified baseline scenario, including a description of the employed technology and related activities. The baseline scenario is justified to be the same as the scenario existing prior to the start of implementation of the proposed project activity, the flaring of associated gas at the oil production site, continuation of the operation of the existing oil and gas infrastructure without any other significant changes, and the use of gas for gas-lift system from the same source and quantity as under the project activity. No reasonable alternative scenario has been overlooked in the context of the proposed CDM project activity. Relevant sectoral policies and circumstances related to the flaring associated petroleum gas in Oman have been considered and listed in the PDD.</p> <p>By checking the PDD and AM0009 (Version 07.0), the validation team confirms the baseline scenario was correctly described in the PDD.</p>
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D.4.6. Demonstration of additionality

Means of validation	<p>In accordance with AM0009 (Version 07.0), the project participants applied step 1 and step 3 of the “Combined tool to identify the baseline scenario and demonstrate additionality” version 07.0, together with the additional guidance in AM0009 Version 07.0 to identify the baseline scenario and demonstrate additionality.</p> <p>Alternatives</p> <p>Following the applied methodology AM0009 (Version 07.0), the PPs applied step 1 of the “Combined tool to identify the baseline scenario and demonstrate additionality” version 07.0, to identify the baseline scenario.</p> <p>As discussed in section D.4.5 above: Scenario (a) and Scenario (b) are plausible and both discussed further. As detailed shown in this section below, the outcome of the investment analysis shows that Scenario (a) above (i.e. The project activity not implemented as a CDM project) is not considered economically attractive by the project participants.</p> <p>Investment Analysis</p> <p>According to AM0009 (version 07.0), the economic attractiveness is assessed for those alternative scenarios that are feasible in technical terms in Step 1 (see section D.4.5 above, Scenario (a) and Scenario (b) are plausible at the end of step 1). Thus, the project participants applied benchmark analysis as per Step 2(b) of the “Methodological tool: Tool for the demonstration and assessment of additionality” (Version 7.0). The economic attractiveness is assessed by determining an expected Internal Rate of Return (IRR) of each alternative scenario.</p> <p>As discussed above, venting or flaring of the associated gas in Oman is not prohibited by law, and not subject to taxes or fines. Accordingly, no taxes or fines need to be taken into account for the proposed project. In addition, the revenues and avoided cost from using the recovered gas to meet the energy demand on-site shall be included in the investment analysis, <u>where applicable</u>. For the proposed project, part of the gas will be used in captive power plant on-site to supply electricity to the project activity. The gas is delivered free of charge to the power plant and the electricity generated by the captive gas power plant is only supplied for the project.</p>
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Therefore, no revenues or avoided cost from using the recovered gas shall be included in the investment analysis. This is in line with the requirements by the applied methodology and methodological tools.

Benchmark analysis

As per methodology tool: Investment analysis, the project belongs to Sectoral Scope 10 "Fugitive Emissions from fuels" and therefore falls under project category Group 2. The default value for the expected return on equity after taxes for the Sultanate of Oman is 10.79% as stated in methodology tool: Investment analysis (version 9.0), which is the latest information at the time of investment decision of 05/03/2019, project start date of 06/05/2019 and construction started on 02/06/2019. However, at the time of validation, Investment analysis (version 10.0) was available, and the date of entry into force is the date of the publication of the EB 105 report on 28/11/2019, Investment analysis (version 10.0) was most available when PDD version 02.0 was prepared in order to publish for global stakeholder consultation. In the Investment analysis (version 10.0), the benchmark equity Internal Rate of Return after tax for the Sultanate of Oman is the 11.66%. Since version 10.0 is the most available for investment analysis, the PP selected equity Internal Rate of Return after tax (IRR) with the 11.66% as benchmark in the PDD, which is appropriate by CTI.

The input parameters used in the investment comparison analysis are verified as follows.

Parameter	Capital expenditures
Value	51,595,802
Unit	USD
Data source	<p>Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant/24/, which is the most available data source at the time of investment decision.</p> <p>The capital expenditures in the Memo/24/ were calculated by process engineer in charge of the project based on Oil and Gas Regulation in Oman/53/, which was approved in Project Authorization Request/32/.</p> <p>Therefore, it is confirmed by CTI that the source of capital expenditures is applicable and reasonable.</p>
Consistency of the value	<p>The Capital expenditures of 51,595,802 USD applied in the investment analysis is fully consistent with the Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant.24/, which is the most available data source at the time of investment decision.</p> <p>Thus, it is confirmed by CTI that the capital expenditures is applicable, reasonable and appropriate.</p>
Justification by the validation team according to VVS	<p><u>Cross Check with Actual Cost</u> According to PAR information of purchase and installation of associated gas recovery and utilization system/32/, the actual amount of investment of the project is 51,633,478 USD, which is 0.07% higher than the amount stated in the Memo. Thus, it is considered reasonable by the validation team.</p> <p><u>Cross Check with similar Registered Project</u> The validation team also crossed -checked the input figure with similar registered CDM projects.</p>

		UNFCC C Ref.	Annual Average Gain Gas (NM ³)	Investment cost (USD)	Investment/ Gain Gas (USD/NM ³)
		6808	27,326,534	10,677,500	0.3907
		6817	337, 020,447	86,066,460	0.2554
		8276	27,304,803	11,770,000	0.4311
		8598	173,440,000	89,845,714	0.5180
		8788	32,076,000	6,521,557	0.2033
		8896	1,139,130,937	1,132,902, 500	0.9945
		9023	31,822,853	41,759,796	1.3123
		9400	52,637,811	84,905,492	1.6130
		10108	7,904,110	4,057,200	0.5133
		Range	7,904,110- 1,139,130,937	4,057,200- 1,132,902, 500	0.2033- 1.6130
		The project	229,558,362.38	51,595,802	0.2248
		Above table listed all the registered projects under AM0009, among which, only PA 6817 is located in Oman, which is in the same country with the proposed project. It is confirmed by CTI that the unit investment of 0.2248 USD/NM ³ for the proposed project is lower than 0.2554 USD/NM ³ of PA6817.			
		Furthermore, validation team checked that the unit investment of 0.2248 USD/NM ³ for the proposed project is in the range of 0.2033-1.6130 USD/NM ³ for other registered associated gas recovery and utilization projects as listed in the table above.			
		As the total investment is almost the same as actual investment occurred, and the unit cost is deemed to be reasonable by comparison, thus validation team is able to confirm that total investment applied is appropriate.			
		Therefore, it is confirmed by CTI that the source and value of capital expenditures are applicable, reasonable and appropriate.			
		Parameter	Annual Operational expenditures		
		Value	591,553		
		Unit	USD/year		
		Data source	Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant /24/, which is the most available data source at the time of investment decision.		
			The annual operational expenditures in the Memo/24/ were calculated by process engineer in charge of the project based on Oil and Gas Regulation in Oman/53/, which was approved in Project Authorization Request/32/.		

		Therefore, it is confirmed by CTI that the source of annual operational expenditures is applicable and reasonable.																																																
	Consistency of the value	The Annual Operational expenditures stated in the PDD is consistent with the value in the Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant/24/., which is the most available data source at the time of investment decision. Thus, it is confirmed by CTI that the annual operational expenditures is applicable, reasonable and appropriate.																																																
	Justification by the validation team according to VVS	<p><u>Cross Check with actual Annual Operational expenditures</u></p> <p>According to invoice for maintain cost in Jan 2020 /44/, the actual maintain cost happened in January 2020 is consistent with the amount stated in the Memo. Thus, it is considered reasonable by the validation team.</p> <p>CTI validation team also cross-checked the registered PDDs and IRR spreadsheet of similar projects (UNFCCC reference) and found that the Annual Operational expenditures is as follow:</p> <table><tr><th>UNFC CC Ref.</th><th>Investment cost (USD)</th><th>Annual Operational expenditures (USD)</th><th>Annual Operational expenditures /investment (%)</th></tr><tr><td>6808</td><td>10,677,500</td><td>680,000</td><td>6.4%</td></tr><tr><td>6817</td><td>86,066,460</td><td>1,017,105</td><td>1.2%</td></tr><tr><td>8276</td><td>11,770,000</td><td>N/A</td><td>3.0%</td></tr><tr><td>8598</td><td>89,845,714</td><td>21,311,429</td><td>23.7%</td></tr><tr><td>8788</td><td>6,521,557</td><td>1,549,157</td><td>23.8%</td></tr><tr><td>8896</td><td>1,132,902,500</td><td>N/A</td><td>8%</td></tr><tr><td>9023</td><td>41,759,796</td><td>6,381,197</td><td>15.3%</td></tr><tr><td>9400</td><td>84,905,492</td><td>3,084,640</td><td>3.6%</td></tr><tr><td>10108</td><td>4,057,200</td><td>1,386,000</td><td>32.4%</td></tr><tr><td>range</td><td>4,057,200-1,132,902,500</td><td>680,000-21,311,429</td><td>1.2%-32.4%</td></tr><tr><td>The project</td><td>51,595,802</td><td>591,553</td><td>1.1%</td></tr></table> <p>Only PA 6817 is located in Oman among the listed projects, which is in the same country with the proposed project. It is confirmed by the validation team that the Annual Operational expenditures accounts for investment (1.1%) is lower than 1.2% of PA6817.</p> <p>Further more, the validation team found the percentage of Annual Operational expenditures accounts for investment (1.1%) is a little bit lower than the minimum value among the other registered projects (1.2%-32.4%) under AM0009. Validation team therefore considers the annual operational expenditures stated in the PDD is conservative and appropriate.</p> <p>Therefore, it is confirmed by CTI that the source and value of annual operational expenditures are applicable, reasonable and appropriate.</p>	UNFC CC Ref.	Investment cost (USD)	Annual Operational expenditures (USD)	Annual Operational expenditures /investment (%)	6808	10,677,500	680,000	6.4%	6817	86,066,460	1,017,105	1.2%	8276	11,770,000	N/A	3.0%	8598	89,845,714	21,311,429	23.7%	8788	6,521,557	1,549,157	23.8%	8896	1,132,902,500	N/A	8%	9023	41,759,796	6,381,197	15.3%	9400	84,905,492	3,084,640	3.6%	10108	4,057,200	1,386,000	32.4%	range	4,057,200-1,132,902,500	680,000-21,311,429	1.2%-32.4%	The project	51,595,802	591,553	1.1%
UNFC CC Ref.	Investment cost (USD)	Annual Operational expenditures (USD)	Annual Operational expenditures /investment (%)																																															
6808	10,677,500	680,000	6.4%																																															
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The project	51,595,802	591,553	1.1%																																															
	Parameter	Projected quantity of gas recovered over the project lifetime																																																

	Value	81,068
	Unit	mmscf
	Data source	<p>Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant/24/, which is the most available data source at the time of investment decision.</p> <p>The value of projected quantity of gas recovered over the project lifetime in the Memo is calculated by the reservoir management team based on projected oil production volumes and Gas/Oil Ratio (GOR)/36/, and the oil production was sourced from the operational production plan approved by Oman government /36/.</p> <p>Therefore, it is confirmed by CTI that the source of quantity of gas recovered is applicable and reasonable.</p>
	Consistency of the value	<p>The Projected quantity of gas recovered and sold stated in the PDD is consistent with the value in the Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant/24/ and statement gas and gains/36/. which is the most available data source at the time of investment decision.</p> <p>Therefore, it is confirmed by CTI that the value of quantity of gas recovered is applicable and appropriate.</p>
	Justification by the validation team according to VVS	<p>By checking statement gas and gains/36/ and on-site communication with the technical staff, the validation team confirmed that volumes of the recovered gas detailed in the memo/36/ and ER spreadsheet were calculated by the reservoir management team based on projected oil production volumes and Gas/Oil Ratio (GOR) at Block-27. The projected gross gains for the proposed CDM project were calculated through multiplying the expected oil production by the Gas/Oil Ratio (GOR), and the oil production was sourced from the operational production plan approved by Oman government /36/.</p> <p>Moreover, the values have been cross-checked with actual data from January 2020 to May 2020 after the project was commissioned since 05/01/2020/41/, The actual average daily quantity of gas recovered in the first five months from January 2020 to May 2020 is 33.08 mmscf, which is lower than the estimated daily value of 34.73 mmscf of the PDD and ER spreadsheet. Since the recovered gas will descend in the future, the value applied in the memo/36/ and ER spreadsheet is conservative.</p> <p>Validation team therefore confirms the Projected quantity of gas recovered over the project lifetime stated in the PDD is applicable, reasonable and appropriate.</p>
	Parameter	Projected quantity of gas used internally over the project lifetime
	Value	3,124
	Unit	mmscf
	Data source	Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant/24/

		<p>at the time of investment decision/24/, which is the most available data source at the time of investment decision.</p> <p>The value of projected quantity of gas used internally over the project lifetime in the Memo is calculated through the operator's estimation based on the compressor capacity, rated power, gas turbine efficiency, etc, which are sourced from technical specifications for compressor/29/.</p> <p>Therefore, it is confirmed by CTI that the source of projected quantity of gas used internally is applicable and reasonable.</p>
	Consistency of the value	<p>The projected quantity of gas used internally stated in the PDD is consistent with the value in the Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant/24/. which is the most available data source at the time of investment decision.</p> <p>Therefore, it is confirmed by CTI that the value of quantity of gas used internally is applicable and appropriate.</p>
	Justification by the validation team according to VVS	<p>Volumes of the quantity of gas used internally detailed in ER spreadsheet were estimated by operator based on the compressor capacity, rated power, gas turbine efficiency, etc, which are sourced from technical specifications for compressor/29/. By reviewing the technical specifications for compressor/29/, the calculation in the ER spreadsheet, the validation team confirmed that the sources for the calculation and the calculation process are deemed to be applicable and appropriate.</p> <p>CTI therefore confirms the projected quantity of gas used internally over the project lifetime stated in the PDD is applicable, reasonable and appropriate.</p>
	Parameter	Projected quantity of gas recovered and sold over the project lifetime
	Value	74,827
	Unit	mmscf
	Data source	<p>Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant/24/, which is the most available data source at the time of investment decision.</p> <p>The value of projected quantity of gas recovered and sold over the project lifetime in the memo/24/ is calculated based on gross recovered gas, gas used internally and shrinkage factor. The data sources for gross recovered gas and gas used internally are discussed above to be applicable. And by checking gas shrinkage factor statement/27/, it is confirmed that the shrinkage factor estimated by the operator through modelling using HYSYS software is also applicable.</p> <p>Therefore, it is confirmed by CTI that the source of quantity of gas recovered and sold is applicable and reasonable.</p>
	Consistency of the	The Projected quantity of gas recovered and sold stated

	value	<p>in the PDD is consistent with the value in the Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman/24/. which is the most available data source at the time of investment decision.</p> <p>Therefore, it is confirmed by CTI that the value of the quantity of gas recovered and sold is applicable and appropriate.</p>
	Justification by the validation team according to VVS	<p>Projected quantity of gas recovered and sold over the project lifetime is calculated as following: Quantity of gas recovered and sold = (projected quantity of gas recovered - projected quantity of gas used internally)*(100%- shrinkage factor).</p> <p>The data sources and values for projected quantity of gas recovered and projected quantity of gas used internally are demonstrated above to be applicable and appropriate.</p> <p>The shrinkage factor is a factor due to gas treatment at gas plant for the purpose of meeting the specifications of the national pipeline. The validation team have verified the shrinkage factor of 4% by checking the computerized model using HYSYS software during on site visit, and confirmed it is applicable and appropriate.</p> <p>CTI therefore confirms the projected quantity of gas recovered and sold over the project lifetime stated in the PDD is applicable, reasonable and appropriate.</p>
	Parameter	Projected quantity of liquid sold over the project lifetime
	Value	2,061,471
	Unit	brl
	Data source	<p>Projected quantity of liquid sold over the project lifetime is sourced from liquid gains statement/28/, which is the most available data source at the time of investment decision.</p> <p>The value of projected quantity of liquid sold over the project lifetime in the PDD and ER spreadsheet is calculated based on projected quantity of gas recovered and sold over the project lifetime and liquid gains factor named NGL(Natural Gas Liquids). The data source for projected quantity of gas recovered and sold over the project lifetime is discussed above to be applicable. And by checking liquid gains statement/28/, it is confirmed that the NGL estimated by the operator through modelling using HYSYS software is also applicable.</p> <p>Therefore, it is confirmed that the data source for projected quantity of liquid sold over the project lifetime is applicable and reasonable.</p>
	Consistency of the value	<p>The value of projected quantity of liquid sold over the project lifetime is calculated based on projected quantity of gas recovered and sold over the project lifetime and NGL. The value for projected quantity of gas recovered and sold over the project lifetime is discussed above to be applicable and appropriate. The value for NGL estimated by the operator through modelling using HYSYS software is 27.55 brls per mmscf recovered gas, which is confirmed to be consistent by checking liquid gains statement/28/.</p>

		Therefore, it is confirmed by CTI that the value of projected quantity of liquid sold over the project lifetime is applicable and appropriate.
	Justification by the validation team according to VVS	<p>The projected quantity of liquid sold over the project lifetime is calculated based on gross recovered gas, gas used internally, shrinkage factor and NGL. The sources and values for gross recovered gas, gas used internally and shrinkage factor are discussed above to be applicable and appropriate. NGL estimated by the operator through modelling using HYSYS software is 27.55 brls per mmscf recovered gas, which is confirmed to be appropriate by checking liquid gains statement/28/.</p> <p>Moreover, the value of projected quantity of liquid sold have been cross-checked with actual data from January 2020 to May 2020 after the project was commissioned since 05/01/2020/41/, The average monthly quantity of gas recovered in the first five months from January 2020 to May 2020 is 24,579 brls, which is lower than the estimated monthly value of 25,756 brls (the first year of projected quantity of liquid sold in ER sheet is 309,066 brls, so the average monthly value is $309,066/12 = 25,756$ brls) in the ER spreadsheet. Thus, the value applied in liquid gains statement/28/ and ER spreadsheet is conservative.</p> <p>Therefore, it is confirmed by CTI that the value of projected quantity of liquid sold over the project lifetime is applicable and appropriate.</p>
	Parameter	Agreed price for the delivery of recovered gas
	Value	Estimated as 1.03 in 2020 (incremental +1.5% per year)
	Unit	USD/mmbtu
	Data source	<p>Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant./24/, which is the most available data source at the time of investment decision.</p> <p>The price in the memo is based on the communications between the project owner and government before the time of investment decision, which was confirmed by the validation team during the on-site visit.</p> <p>The data source for price for the delivery of recovered gas is applicable and reasonable.</p>
	Consistency of the value	<p>The agreed price for the delivery of recovered gas applied in the investment analysis is fully consistent with the Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant, which is the most available data source at the time of investment decision.</p> <p>Therefore, it is confirmed by CTI that the value of the agreed price for the delivery of recovered gas is applicable and appropriate.</p>
	Justification by the validation team	As of the on-site inspection and interview with Ministry of Oil & Gas, and Occidental of Oman, INC, CTI confirmed

	according to VVS	<p>that the operator discussed the gas price with Oman government in Feb 2019, and the expected price was determined as 1.03 US\$/mmbtu at the time of investment decision.</p> <p>The agreed price for the delivery of recovered gas at the delivery point is verified by checking Gas Sales and Purchase Agreement (GSPA) signed on 01/01/2020/45/. By checking the Gas Sales and Purchase Agreement/45/, the validation team confirmed that gas price is US\$1.0300 per mmbtu (incremental +1.5% per year), which is in line with the gas price determined at the time of investment decision.</p> <p>CTI therefore confirms the price for the delivery of recovered gas stated in the PDD is applicable, reasonable and appropriate.</p>
	Parameter	Net calorific value of the recovered gas
	Value	42.441
	Unit	MJ/m ³
	Data source	<p>Net calorific value of the recovered gas is sourced from Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant/24/. which is the most available data source at the time of investment decision.</p> <p>The net calorific value in the memo is calculated based on the lab analyzed data for the recovered gas components and the net calorific value for each component according to ISO6976. The validation team checked the laboratory report/40/ and relevant data in ISO6976 and confirmed that the data source for net calorific value of the recovered gas is applicable and reasonable.</p>
	Consistency of the value	<p>Net calorific value of the recovered gas in PDD and ER spreadsheet is consistent with the Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman provided by the project participant/24/, which is the most available data source at the time of investment decision.</p> <p>Therefore, it is confirmed by CTI that the value of net calorific value of the recovered gas is applicable and appropriate.</p>
	Justification by the validation team according to VVS	<p>Validation team checked the laboratory report/40/, and relevant data in ISO6976/22/, and the calculation for net calorific value of the recovered gas in the ER spreadsheet, and confirmed that molar percent and the net calorific value for each component applied in the calculation are consistent with the data sources, the calculation process are deemed appropriate.</p> <p>CTI therefore confirms net calorific value of the recovered gas stated in the PDD is applicable, reasonable and appropriate.</p>
	Parameter	Expected price for liquid gains
	Value	58

	Unit	US\$/Brl
	Data source	Official oil price for budget purpose at investment decision, as per Oman State General 2019 Budget published in January 2019.
	Consistency of the value	Official oil price for budget purpose at investment decision, as per Oman State General 2019 Budget published on January 2019.
	Justification by the validation team according to VVS	Validation team confirmed that the liquid price was estimated at the time of investment decision as per official oil price by checking Oman State General 2019 Budget published on January 2019/35/. Thus, it is considered as appropriate by CTI.
	Parameter	Income tax rate for Operator
	Value	55
	Unit	%
	Data source	Oman Tax Law effected on 24/05/2009, amended by Royal Decree in Sep 2017/34/, which is the most valid data for income tax at the time of investment decision.
	Consistency of the value	The applied income tax rate is consistent with Oman Tax Law /34/
	Justification by the validation team according to VVS	As per Oman Tax Law, companies engaged in petroleum operations are subject to tax at 55%. Thus, the income tax rate of 55% is applicable to the operator.
	Parameter	Project lifetime
	Value	10
	Unit	years
	Data source	Technical manual of the compressors
	Consistency of the value	The applied project lifetime is consistent with Technical manual of the compressors /43/
	Justification by the validation team according to VVS	According to manufacturer specifications, compressors lifetime should be of 10 years for products properly maintained and used according to instructions. Thus, it is considered as appropriate by CTI.
	Parameter	The proportions for cost recovered (gas part), cost recovered (liquid part), profit share for associated gas, profit share for liquid
	Value	Cost recovered (gas part) is 40%, cost recovered (liquid part) is 40%, profit share for associated gas is 20%, profit share for liquid is 20%
	Unit	%
	Data source	Note for Exploration and Production sharing agreement between operator and Oman Government /47/. The cost and profit sharing percentages in the note are based on the discussion between the operator and Oman Government before the time of investment decision. According to the discussion and the note, the first 40% annual revenue of gas and liquid can be used by operator to recover its costs, then from the remaining 60%, 20% can be retained by Operator. The IRR calculations reflect such structure. The proportions for cost recovered (gas part), cost

		<p>recovered (liquid part), profit share for associated gas, profit share for liquid are confirmed by checking the Exploration and Production sharing agreement signed between operator and Oman Government /56/ by the validation team during the on-site visit.</p> <p>CTI could confirm the data source for the proportions for cost recovered (gas part), cost recovered (liquid part), profit share for associated gas and profit share for liquid is applicable and reasonable.</p>
	Consistency of the value	<p>The proportions for cost recovered (gas part), cost recovered (liquid part), profit share for associated gas, profit share for liquid applied in the investment analysis are fully consistent with the Note for Exploration and Production sharing agreement between operator and Oman Government /47/ and Exploration and Production sharing agreement signed between operator and Oman Government /56/ provided by the project participant.</p> <p>Therefore, it is confirmed by CTI that the values of the proportions are applicable and appropriate.</p>
	Justification by the validation team according to VVS	<p>As of the on-site inspection and interview with Ministry of Oil & Gas, and Occidental of Oman, INC, CTI confirmed that the operator and Oman government discussed the cost and profit sharing percentages for cost recovered (gas part), cost recovered (liquid part), profit share for associated gas, profit share for liquid, and agreed on the Note for Exploration and Production sharing agreement /47/ before the time of investment decision.</p> <p>Note for Exploration and Production sharing agreement between operator and Oman Government /47/ and Exploration and Production sharing agreement signed between operator and Oman Government /56/ were checked by the validation team, then confirmed that the values of the sharing percentages in the note are consistence with the signed agreement.</p> <p>Furthermore, referring to the registered CDM project "Associated Gas Recovery and Utilization at Block 9"(6817), for which the operator and PP are the same as the proposed project, and are both located in the Al-Dhahirah Governorate of Oman, the cost and profit sharing percentages for cost recovered (gas part), cost recovered (liquid part), profit share for associated gas and profit share for liquid of PA 6817 are also same as the proposed project /57/. Thus, the values of the proportions are crosschecked to be reasonable and appropriate.</p> <p>CTI therefore confirms the proportions for cost recovered (gas part), cost recovered (liquid part), profit share for associated gas, profit share for liquid applied in the IRR spreadsheet are applicable, reasonable and appropriate.</p>
	<p>Calculation and conclusion</p> <p>The IRR calculations provided and transparently calculated in the spread sheet has been checked for the accuracy and reproducibility of the calculations. The assumptions and calculations were verified and found to be correct. As per the latest Investment Analysis Tool (Version 07.0), the period of investment analysis may</p>	

shorter than technical lifetime but shall be conducted for at least for 10 years. The project conducted the investment analysis for 10 years which CTI validation team considered reasonable. The financial indicator of investment analysis shows that the equity IRR of the project is 7.37% (after-tax), which is lower than the benchmark in Oman, namely of 11.66% (after-tax) in Investment analysis version 10.0, and/or previously 10.79% (after-tax) in Investment analysis version 9.0. Therefore, without carbon revenue the project is not financially attractive.

Sensitivity Analysis

According to the "Methodological tool: Investment analysis" (version 10.0), variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets.

A sensitivity analysis was carried out for parameters contributing more than 20% to revenues or costs in order to check the robustness of the financial analysis, which includes the capital expenditures, annual Operational expenditures, gas volumes / gas price, liquid gains / liquid price. The variations necessary to reach the benchmark were determined and the likelihood for the project IRR to cross the benchmark was discussed. Validation team was able to verify that the project IRR will touch the benchmark only if the below mentioned parameters change by values as mentioned below:

Key parameters	Variations at which project IRR touch the benchmark	Validation
Capital expenditures	If project capital expenditures decrease by 33.8%, the IRR reaches the benchmark.	According to PAR (Project Authorization Request) information of purchase and installation of associated gas recovery and utilization system/32/ provided by the operator, the actual amount of investment of the project is 51,633,478 USD, which is 0.07% higher than the amount stated in the Memo. Furthermore, the compressor invoice/42/ and electrical facilities/43/ have been provided to CTI for crosscheck. Therefore, it's impossible for the capital expenditures to decrease by 33.8% to reach the benchmark.
Annual Operational expenditures	Not possible	This is impossible to happen. Even when annual operational expenditures decrease by more than -100%, the IRR still could not reach the benchmark. It is not possible for the annual operational expenditures variations to reach the benchmark.
Gas volumes/ gas price	If project gas volumes/ gas price increases by 58.50%, the IRR	As verified based on the on-site inspection, the recovered gas volume was derived based on projected oil production volumes and Gas/Oil Ratio (GOR) at Block-27/41/

		reaches the benchmark.	<p>the 58.50% escalation of the gas volumes during the crediting period is highly unlikely to happen. The expected gas volume has been cross-checked with actual data after the project was commissioned since 05/01/2020/41/. The actual average daily quantity of gas recovered in the first five months from January 2020 to May 2020 is 33.08 mmscf, which is lower than the estimated daily value of 34.73 mmscf. Validation team therefore considers the Projected quantity of gas recovered and sold over the project lifetime stated in the PDD is appropriate.</p> <p>The gas price in PDD is derived from the Memo/24/ as discussed between the PP and the operator. which is the same as the signed GSPA (Gas Supply and Purchase Agreement) /45/ signed on 01/01/2020.</p> <p>Thus it is impossible for the gas volume/price to increase by 58.50% during the crediting period.</p>
	Liquid gains/ liquid price	If project liquid gains/ liquid price increases by 44.20%, the IRR reaches the benchmark.	<p>The escalation of 44.20% in the liquid gains or liquid price is highly unlikely since the liquid volumes were estimated by the operator through complex modelling using HYSYS software based on gas composition. The expected liquid gains has been cross-checked with actual data after the project was commissioned since 05/01/2020/41/. The actual average monthly quantity of gas recovered in the first five months from January 2020 to May 2020 is 24,579 brls, which is lower than the estimated monthly value of 25,756 brls (the first year of projected quantity of liquid sold in ER sheet is 309,066 brls, so the average monthly value is $309,066/12 = 25,756$ brls) in the ER spreadsheet. Validation team therefore considers the projected quantity of liquid gains recovered and sold over the project lifetime stated in the PDD is appropriate.</p> <p>The Liquid price is the Official oil price for budget purpose at investment decision as per Oman State General 2019 Budget published on January 2019. The oil price has been dropped hugely, at the time when the validation is in finalization, the Brent oil price is only around 40US\$/Brl, which is far below the estimation of 58 US\$/Brl in the PDD. Furthermore, according to the demonstration in the article "Coping with a Dual Shock: COVID-19 and Oil Prices" /54/, the oil price will not rise greatly in recently years because the economy of the whole world was affected by covid-19 forecasted by world bank.</p> <p>Therefore, it's unlikely for the liquid volume/price to increase by 44.20%.</p>

The validation team thus confirms that the sensitivity analysis is in accordance with the “Tool for demonstration and assessment of additionality” (version 07.0.0) and “Methodological tool: investment analysis” version 10.0. All input parameters used for sensitive analysis constitute more than 20% of either total project costs or total project revenues. The justifications provided by the PP with the variations of these parameters are been analyzed and accepted by CTI.

Barrier analysis

Barrier analysis was not applied for this project.

Common practice analysis

As per Tool: Common Practice (03.1) /17/, projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory frame-work, investment climate, access to technology, access to financing, etc. The common practice analysis is presented through the following 4 steps.

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity

The average annual gross gas recovery volume 23.16mmscfd, therefore the applicable $\pm 50\%$ project output range is average annual gross gas recovery volume between 11.58 mmscfd and 34.74 mmscfd. are considered as similar size.

Step 2: Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

- (a) The projects are located in the applicable geographical area;
- (b) The projects apply the same measure as the proposed project activity;
- (c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
- (d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
- (e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
- (f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Validation team has checked the concession boundaries from officially publicly available source Oman society for Petroleum Services /49/ and the Confirmation on the common practice analysis for the oil and gas concession blocks in Oman

/50//55/, and can confirm all the oil and gas concessions in the Sultanate of Oman was listed and discussed in the PDD to identify all plants delivering the same output as the proposed project as discussed in step 1 above, thus considered to be appropriate. The table below summarizes the outcomes.

Block No.	Key information	Conclusion
3	Oil production began in August 2010. There are no facilities for the recovery of associated gas.	No recovery of associated gas, excluded.
4		
5	Associated gas is recovered since 2017. The average associated gas production is 35 mmscfd	Block 5 doesn't fall into applicable capacity or output range between 11.58 mmscfd and 34.74 mmscfd. As its production is close to 34.74 mmscfd, Block 5 is further discussed and in Sub-step 3 below.
6	Associated gas recovery production is around 600 mmscfd. there are initiatives of gas reduction projects.	Associated gas production is around 600 mmscfd, not in range between 11.58 mmscfd and 34.74 mmscfd. Excluded.
7	According to public data source, for Block 7, there is little gas associated with oil which is heavy and viscous and will not flow readily and continuously. No facilities installed for recovery of associated gas.	No recovery of associated gas, excluded.
8	Offshore oil field.	Offshore is different oil extraction technology with the onshore of the proposed project, excluded.
9	Registered CDM project (PA 6817)	CDM project, excluded.
15	Still in exploration phase.	Currently no oil producing, excluded.
17	Still in exploration phase.	Currently no oil producing, excluded.
27	The proposed project	
30	Still in exploration phase.	Currently no oil producing, excluded.
31	Still in exploration phase.	Currently no oil producing, excluded.
36	Still in exploration phase.	Currently no oil producing, excluded.
39	Still in exploration phase.	Currently no oil producing, excluded.
40	Offshore oil field.	Offshore is different oil extraction technology with the onshore of the proposed project, excluded.
42	Still in exploration phase.	Currently no oil producing, excluded.
44	Block 44 is primarily a natural gas and condensate field.	Gas field, not oil field, excluded.
48	Still in exploration phase.	Currently no oil producing, excluded.
49	Still in exploration phase.	Currently no oil producing, excluded.
50	Offshore oil field.	Offshore is different oil extraction technology with the onshore of the proposed project, excluded.

52	Still in exploration phase.	Currently no oil producing, excluded.
53	There are no facilities for the recovery of associated gas.	No recovery of associated gas, excluded.
54	Still in exploration phase.	Currently no oil producing, excluded.
56	Still in exploration phase.	Currently no oil producing, excluded.
57	Still in exploration phase.	Currently no oil producing, excluded.
60	Block 60 is a tight gas field, it's unconventional gas project.	Gas field, not oil field, excluded.
61	Block 61 is unconventional gas project.	Gas field, not oil field, excluded.
62	Block 62 is gas field.	Gas field, not oil field, excluded.
66	Still in exploration phase.	Currently no oil producing, excluded.
67	Still in exploration phase.	Currently no oil producing, excluded.

Step 3: Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all} .

From analysis above, only Block 5 delivers an output close to the applicable output range defined in sub-step 1 (but actually not within the applicable output range) and has started commercial operation before the start date of the proposed CDM project is. Therefore, the parameter N_{all} is 1.

Step 4: Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}

According to IFC press release on 02/03/2005 "IFC Provides \$40 Million to Mazoon Petrogas SAOC in Oman"/51/, the International Finance Corporation (IFC), has agreed to provide long-term corporate financing of up to \$40 million to Gas recovery and utilization activities at Block 5, thus it differs from the proposed CDM project by the 'investment climate in the date of the investment decision' with regard to 'subsidies or other financial flows'.

In conclusion, Block 5 applied different technology compare with the proposed project according to the criteria provided by the Common Practice, the parameter $N_{diff} = 1$.

Step 5: calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity. The proposed project activity is a "common practice" within a sector in the

	<p>applicable geographical area if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3.</p> <p>Based on the above analysis, the parameter F representing the share of projects using technology similar to the technology used in the project activity in all projects that deliver the same output as the project activity:</p> $F = 1 - N_{diff}/N_{all} = 0 < 0.2,$ <p>And $N_{all} - N_{diff} = 1 - 1 = 0 < 3$</p> <p>Since F is less than 0.2, $N_{all} - N_{diff} = 0$, it can be concluded that the project is not a 'common practice' within the sector in the applicable geographical area. The requirements of the common practice analysis are fulfilled and the project is additional.</p> <p>In conclusion, all the steps above are satisfied, the proposed CDM project is not the baseline scenario, and the proposed project activity is additional.</p>
Findings	<p>CAR 2: Regarding the input parameters applied in investment analysis and project IRR calculations, corrective action is requested to: 1) list the main parameters and data source for relevant input values in published PDD version 01; 2) demonstrate all input values used in investment analysis is valid and applicable at the time of the investment decision taken by the project participant; 3) please provide other data source and/ or evidence for the purpose of cross check; 4) Please provide the investment analysis spreadsheet presented in a transparent manner, with readable formulas, all relevant cells are viewable and unprotected.</p> <p>CAR 3: Regarding the sensitivity analysis in PDD, it is requested to: 1) list the key parameters that constitute more than 20% of either total project costs or total project revenues; 2) present the results of key parameters subjected to reasonable variation, at least cover a range of +10% and -10%; 3) analysis the likelihood of the occurrence of parameters variation to reach or over the benchmark as per "Methodological tool: Investment analysis".</p> <p>CAR 4: The proposed project is a large-scale CDM project activity, and not a first of its kind. Please take a step-wise approach to conduct a common practice analysis as per the requirements by Project standard.</p>
Conclusion	<p>Refer to CAR 2~CAR 4 as above, they are responded satisfactorily as detailed in the below Appendix 4 of the report. Therefore, the CAR 2~CAR 4 are closed.</p> <p>The CDM was seriously considered by the PP. The evidences were transparently reviewed by the validation team and considered to be effective. Investment analysis and sensitivity analysis clearly demonstrate that the proposed project activity is financially unattractive. Common practice analysis was carried out showing that the proposed project activity is not a 'common practice' within the sector in the applicable geographical area. Therefore, the proposed project activity is not business-as-usual, i.e. the proposed project activity is additional.</p>

D.4.7. Estimation of emission reductions or net anthropogenic removals

Means of validation	The validation team has assessed the calculations of baseline emissions and emission reductions. Corresponding calculations have been carried out based on calculation spread sheet. The parameters and equations presented in the PDD, as
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well as other applicable documents, have been compared with the information and requirements presented in the methodology and respective tools. An equation comparison has been made to ensure consistency between all the formulae presented in the calculation files and in the PDD, methodology, and tools.

The assumptions and data used to determine the emission reductions are listed in the PDD and all the sources have been checked. Based on the information reviewed it is confirmed that the sources used are correctly quoted and interpreted in the PDD.

The values presented in the PDD are considered reasonable based on the documentation and references reviewed and the results of the interviews. The baseline methodology has been applied correctly according to requirements.

The estimate of the baseline emissions is considered correct as the calculations have been reproduced by the validation team with the attainment of the same results. The algorithms for the determination of the baseline, project, and leakage are discussed in the following sections.

Baseline Emissions

The calculation of the baseline emissions follows the procedures described in the methodology AM0009 (Version 07.0). Project activities under this methodology reduce emissions utilizing the recovered gas. The utilization of the recovered gas displaces the use of other fossil fuel sources.

As per the applied methodology AM0009 (Version 07.0), the baseline emissions for the proposed project is determined as follows:

$$BE_y = V_{F,y} \times NCV_{BG,F,y} \times EF_{CO_2,Methane} \quad (1)$$

Where:

BE_y	Baseline emissions in year y , (t CO ₂ e)
$V_{F,y}$	Volume of total recovered gas measured at point F in methodology AM0009 version 07.0 Figure 2 in year y (Nm ³)
$NCV_{BG,F,y}$	Average net calorific value of recovered gas at point F in methodology AM0009 version 07.0 Figure 2 in year y (TJ/Nm ³)
$EF_{CO_2,Methane}$	CO ₂ emission factor for methane (t CO ₂ /TJ)

Based on the formula applied, the validation team confirms that the data has been calculated correctly.

1) Volume of total recovered gas measured at point F in methodology AM0009 version 07.0 Figure 2

The volume of the total recovered gas at point F will be continuously measured as per the requirements by methodology AM0009 version 07.0. For the purpose of expected value applied in the ex-ante baseline emission calculations, it is listed in

Appendix 4 in revised PDD Version 03.0, as shown in table below.

Year	Daily Gross gas gains (mmscf per day)	Yearly gross gas gains (mmscf)	Yearly gas gains at methodology Figure 2 Point F (Nm ³)
2020 (full year)	34.73	12,154	330,904,727
2021	34.73	12,154	330,904,727
2022	33.68	11,789	320,977,586
2023	33.68	11,789	320,977,586
2024	26.04	9,116	248,178,546
2025	20.84	7,292	198,542,836
2026	17.36	6,077	165,452,364
2027	13.89	4,862	132,361,891
2028	8.68	3,039	82,726,182
2029	7.99	2,795	76,108,087

Note: The crediting period start date is estimated to be 05/08/2020, the gas gains at methodology Figure 2 Point F accounts for 149 days from 05/08/2020 to 31/12/2020 for year 2020, $330,904,727 \times 149/366 = 134,712,580 \text{ Nm}^3$.

Yearly gas gains at methodology Figure 2 Point F is calculated as following:

Yearly gas gains at methodology Figure 2 Point F = Yearly gross gas gains - gas used internally

Yearly gross gas gains for the proposed CDM project were calculated through multiplying the expected oil production by the Gas/Oil Ratio (GOR), and the oil production was sourced from the operational production plan approved by Oman government /36/.

The quantity of gas used internally in ER spreadsheet were estimated by operator based on the compressor capacity, rated power, gas turbine efficiency, etc, which are sourced from technical specifications for compressor/29/. By reviewing the technical specifications for compressor/29/, the calculation in the ER spreadsheet, the validation team confirmed that the sources for the calculation and the calculation process are deemed to be applicable and appropriate.

The designed project lifetime is 10 years, and the project put into operation since 05/01/2020. Thus, Volume of total recovered gas measured at point F ($V_{F,y}$) is zero for the period 01/01/2030-04/08/2030.

By reviewing the Memo/24/, gas and gains statement /36/ provided, as well as revised ER spreadsheet /4/, the validation team confirms that the volume of total recovered gas measured at point F in methodology AM0009 version 07.0 Figure 2 based on projected oil production volumes and Gas/Oil Ratio (GOR) at Block-27, which is also the basis at the time of investment decision, and correctly presented in the PDD and ER spreadsheet.

2) Average net calorific value of recovered gas at point F in methodology AM0009

version 07.0 Figure 2.

The average net calorific value of recovered gas at point F will be monitored as per the requirements by methodology AM0009 version 07.0. For the purpose of expected value applied in the ex-ante baseline emission calculations, it is basing the gas composition measurements and NCV calculations.

Content	NCV (MJ/m ³) (Sourced from ISO 6976)	NCV (Btu/scf) (Converted from MJ/m ³)	Gas Composition Analysis report (%mol)
hydrogen	10.788	290	0
nitrogen	0	0	2.99
C6 group	173.41	4654	0.36
methane	35.808	961	78.13
CO ₂	0	0	2.72
ethane	63.74	1711	7.25
propane	91.15	2446	4.68
i-butane	118.15	3171	0.93
n-butane	118.56	3182	1.75
i-pentane	145.66	3909	0.56
n-pentane	145.96	3917	0.55
C7+	200.82	5390	0.08
total	42.441	1139.07	100

By reviewing the gas analysis report reported date of 08/10/2019/40/ provided, the latest available data, as well as revised ER spreadsheet /4/ and ISO 6976 /22/, the validation team confirms that the NCV calculation is transparent and correct and in line with the requirements by methodology AM0009 version 07.0.

3) CO₂ emission factor for methane

Default value 54.834 t CO₂/TJ is applied, it is in line with ISO 6976: Table 3. Carbon content, CO₂ emission factor and NCV of methane.

As a result, the baseline emissions are calculated as below:

Year	V _{F,y} (Nm ³)	NCV _{RG,F,y} (TJ/Nm ³)	EF _{CO₂,Methane} (tCO ₂ /TJ)	BE _y (tCO _{2e})
05/08/2020-31/12/2020	134,712,580	0.000042441	54.834	313,503
01/01/2021-31/12/2021	330,904,727	0.000042441	54.834	770,080
01/01/2022-31/12/2022	320,977,586	0.000042441	54.834	746,978
01/01/2023-31/12/2023	320,977,586	0.000042441	54.834	746,978
01/01/2024-31/12/2024	248,178,546	0.000042441	54.834	577,560
01/01/2025-31/12/2025	198,542,836	0.000042441	54.834	462,048

01/01/2026-31/12/2026	165,452,364	0.000042441	54.834	385,040
01/01/2027-31/12/2027	132,361,891	0.000042441	54.834	308,032
01/01/2028-31/12/2028	82,726,182	0.000042441	54.834	192,520
01/01/2029-31/12/2029	76,108,087	0.000042441	54.834	177,118
01/01/2030-04/08/2030	0	0.000042441	54.834	0
Total	2,010,942,385			4,679,859

In conclusion, the validation team can confirm that estimated baseline emissions reported in the CDM-PDD are based on estimated gas and gains statement /36/, basing on actual gas volumes flared prior to implementation of the proposed project and the maximum gas recovery capacity installed as part of the CDM project.

Project emissions

According to methodology AM0009 (Version 07.0), the project emissions shall be calculated by the following equation:

$$PE_y = PE_{CO_2, fossil\ fuels, y} + PE_{CO_2, elec, y} \quad (2)$$

Where:

PE_y	Project emissions in year y , (t CO ₂ e)
$PE_{CO_2, fossil\ fuels, y}$	CO ₂ emissions due to consumption of fossil fuels for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to the point F in Figure 2 in year y (t CO ₂ e)
$PE_{CO_2, elec, y}$	CO ₂ emissions due to the use of electricity for recovery, pre-treatment, transportation and, if applicable, compression of the recovered gas up to the point F in Figure 2 in year y , (t CO ₂ e)

As confirmed by the on-site inspection, interview, and checking the operating records, etc., it is confirmed that the project activity only involves use of electricity to run the compression, pre-treatment and transportation equipment, and no project emissions from the fossil fuel consumption as part of project activity. Thus, as per the methodology AM0009 (Version 07.0), $PE_{CO_2, fossil\ fuels, y} = 0$.

As per methodology AM0009 (Version 07.0), project emissions $PE_{CO_2, elec, y}$ are calculated applying the latest approved version of the "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" where $PE_{CO_2, elec, y}$ corresponds to $PE_{EC, y}$ in the tool and the electricity consumption sources j in the tool corresponds to all sources of electricity consumption (e.g. a compressor, etc.) up to point F in Figure 2.

The PPs applied the generic approach for project emissions, which is based on the

quantity of electricity consumed, an emission factor for electricity generation and a factor to account for transmission losses as per “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” to calculate project emissions from consumption of electricity:

$$PE_{CO2,elec,y} = PE_{EC,y} \quad (3)$$

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EF,j,y} \times (1 + TDL_{j,y}) \quad (4)$$

Where:

$PE_{CO2,elec,y}$	CO ₂ emissions due to the use of electricity for recovery, pre-treatment, transportation and, if applicable, compression of the recovered gas up to the point F in methodology AM0009 version 07.0 Figure 2 in year y, (t CO ₂ e)
$PE_{EC,y}$	Project emissions from electricity consumption in year y (t CO ₂ / yr)
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EF,j,y}$	Emission factor for electricity generation for source j in year y (t CO ₂ /MWh)
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y
j	Sources of electricity consumption in the project

Determination of the emission factor for electricity generation ($EF_{EL,j/k/l,y}$)

For the proposed project activity, it will consume the electricity from an off-grid captive power plant, in this case, it is Scenario B in “*Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)*”. Since the CO₂ emissions from fuel combustion and the electricity generation in the captive power plant are not available, Option B1 is not applicable. Thus the PPs applied Option B2, using the conservative default value. The electricity consumption source is a project electricity consumption source, and there is no baseline electricity consumption source, the PPs applied a conservative value of 1.3tCO₂/MWh, which is in line with the “*Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0)*”, and considered to be appropriate by the validation team.

Determination of the quantity of electricity consumed by the project electricity consumption source j in year y ($EC_{PJ,j,y}$)

The proposed project will consume electricity for reciprocating compression units, including compressors, motors, air cooled exchangers, scrubbers, discharge scrubbers and suction bottles. The actual quantity of all the electricity consumed by the project electricity will be monitored through the electricity meter installed at the project site. The expected electricity consumption for each unit is estimated ex-ante

through multiplying the total power capacity of the units of 6.174 MW by the expected operating hours.

According to the Compressor technical specifications/29/, the designed working days during the project lifetime is 350 days per year. The expected operating hours are calculated as daily gross gas gains based on statement of estimated gas and gains/36/ divided by total installed compression capacity (40mmscfd) based on compressor technical specifications/29/, and then multiplied by 24 hours and 350 days. It is confirmed that the expected operating hours is appropriate by checking the data sources and calculation process. It is also considered to be conservative by the validation team, considering the annual downtime for maintenance.

The designed project lifetime is 10 years, and the project put into operation since 05/01/2020. Thus, quantity of electricity consumed by the project ($EC_{PJ,y}$) is zero for the period 01/01/2030-04/08/2030.

Determination of average technical transmission and distribution losses for providing electricity to source j in year y ($TDL_{j,y}$)

According to the tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”, it is explicitly indicates that in case of scenario B assume $TDL_{j,y} = 0$ as a simplification. The electricity consumption situation for the proposed project is scenario B “Electricity consumption from an off-grid captive power plant”. Thus, $TDL_{j,y}$ is 0 for the proposed project.

Thus, the project emissions are calculated as follow:

Year	$PE_{CO_2, \text{fossil fuels}, y}$ (tCO ₂ /yr)	$EC_{PJ,y}$ (MWh/yr)	$EF_{EL,j,y}$ (tCO ₂ /MWh)	$TDL_{j,y}$ /	$PE_{EC,y}$ (tCO ₂ /yr)	PE_y (tCO ₂ /yr)
05/08/2020-31/12/2020	0	18,329	1.3	0	23,828	23,828
01/01/2021-31/12/2021	0	45,024	1.3	0	58,531	58,531
01/01/2022-31/12/2022	0	43,673	1.3	0	56,775	56,775
01/01/2023-31/12/2023	0	43,673	1.3	0	56,775	56,775
01/01/2024-31/12/2024	0	33,768	1.3	0	43,898	43,898
01/01/2025-31/12/2025	0	27,014	1.3	0	35,118	35,118
01/01/2026-31/12/2026	0	22,512	1.3	0	29,265	29,265
01/01/2027-31/12/2027	0	18,009	1.3	0	23,412	23,412
01/01/2028-31/12/2028	0	11,256	1.3	0	14,633	14,633
01/01/2029-31/12/2029	0	10,355	1.3	0	13,462	13,462
01/01/2030-04/08/2030	0	0	1.3	0	0	0
Total		273,614				355,698

Leakage

According to methodology AM0009 (Version 07.0), leakage emissions shall be accounted for project activities where the recovered gas is transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensates) and the dry gas is compressed to CNG first, then transported by trailers/trucks/carriers and then decompressed again, before it finally enters the gas pipeline. For other types of project activities, leakage emissions need not to be considered.

As confirmed by the validation team during the on-site inspection, for the proposed project activity, the dry gas is directly sold to the pipeline, without being compressed to CNG first then transported by trailers/trucks/carriers and then decompressed again, before entering the pipeline. Thus, the project participants do not consider leakage emissions, which is in line with methodology AM0009 (Version 07.0) by the validation team.

Therefore, $LE_y = 0$.

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average ex-ante estimation of emission reduction conservatively calculated to be 432,416 tCO_{2e}/year and total 4,324,161 tCO_{2e} over the 10years fixed crediting period. For details, please see the table below:

Year	Baseline emissions (tCO _{2e})	Project emissions (tCO _{2e})	Leakage (tCO _{2e})	Emission reductions (tCO _{2e})
05/08/2020-31/12/2020	313,503	23,828	0	289,675
01/01/2021-31/12/2021	770,080	58,531	0	711,550
01/01/2022-31/12/2022	746,978	56,775	0	690,203
01/01/2023-31/12/2023	746,978	56,775	0	690,203
01/01/2024-31/12/2024	577,560	43,898	0	533,662
01/01/2025-31/12/2025	462,048	35,118	0	426,930
01/01/2026-31/12/2026	385,040	29,265	0	355,775
01/01/2027-31/12/2027	308,032	23,412	0	284,620
01/01/2028-31/12/2028	192,520	14,633	0	177,887
01/01/2029-31/12/2029	177,118	13,462	0	163,656
01/01/2030-04/08/2030	0	0	0	0
Total	4,679,859	355,698	0	4,324,161
Total number of crediting years	10 years 0 month			
Annual average over the crediting period	467,986	35,570	0	432,416

Findings	N/A
Conclusion	All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable and conservative in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD. CTI can confirm that estimated emissions reductions reported in the CDM-PDD are based on actual gas volumes flared prior to implementation of the proposed project and the maximum gas recovery capacity installed as part of the CDM project.

D.4.8. Monitoring plan

Means of validation	<p>Parameters determined ex-ante</p> <p>The following parameters are determined ex-ante and verified by the validation team:</p> <table border="1"> <thead> <tr> <th>Parameters</th><th>Description</th></tr> </thead> <tbody> <tr> <td>$EF_{CO_2, Methane}$</td><td>CO₂ emission factor for methane</td></tr> <tr> <td>$TDL_{j,y}$</td><td>Average technical transmission and distribution losses for providing electricity to source j in year y</td></tr> <tr> <td>$EF_{EF,j,y}$</td><td>Emission factor for electricity generation for source j in year y</td></tr> </tbody> </table> <p>The validation team confirms that all relevant parameters have been sufficiently considered and the values of the parameters are real, measurable and conservative.</p> <p>Parameters monitored ex-post</p> <p>According to the approved methodology AM0009 (Version 07.0), the following parameters will be monitored:</p> <table border="1"> <thead> <tr> <th>Parameters</th><th>Description</th></tr> </thead> <tbody> <tr> <td>$V_{F,y}$</td><td>Volume of the total recovered gas measured at point F in methodology AM0009 version 07.0 Figure 2 in year y</td></tr> <tr> <td>$NCV_{RG,F,y}$</td><td>Average net calorific value of recovered gas at point F in methodology AM0009 version 07.0 Figure 2 in year y</td></tr> <tr> <td>$EC_{PJ,j,y}$</td><td>Quantity of electricity consumed by the project electricity consumption source j in year y</td></tr> </tbody> </table> <p>$V_{F,y}$: Data will be measured continuously by flow meter. Measurements will be taken at the point where recovered gas exits the pre - treatment, and after part of the recovered gas is used on-site. Through the on-site observation, it is confirmed</p>	Parameters	Description	$EF_{CO_2, Methane}$	CO ₂ emission factor for methane	$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y	$EF_{EF,j,y}$	Emission factor for electricity generation for source j in year y	Parameters	Description	$V_{F,y}$	Volume of the total recovered gas measured at point F in methodology AM0009 version 07.0 Figure 2 in year y	$NCV_{RG,F,y}$	Average net calorific value of recovered gas at point F in methodology AM0009 version 07.0 Figure 2 in year y	$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y
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that the location of the flow meter is in line with monitoring plan in PDD. Volume of the recovered gas at point F in methodology AM0009 version 07.0 Figure 2 will be continuously monitored and automatically converted to the national standard condition (reference temperature of 25°C). The accuracy of flow meter in the monitoring plan is 0.04%, which is confirmed consistency by the on-site inspection. The flow meters will be calibrated at least once per year.

NCV_{RG,F,y}: NCV will be calculated basing on gas composition through lab analysis of the recovered associated gas. Gas composition measurements will be undertaken at the on-site lab nearby according to national or international fuel standards, and the validation team checked the lab during the on-site visit. The frequency of samples will be at least monthly through calibrated gas analyzer through chemical analysis.

The calculation for NCV is the sum of molar fraction of each individual component in the natural gas sample multiplied by net calorific value of each individual component in the natural gas sample as referenced in ISO 6976.

EC_{PJ,i,y}: The electricity consumption by the project activity will be continuously measured by electricity meter installed at point F in methodology AM0009 version 07.0 Figure 2, the data will be recorded monthly. The accuracy level is 0.5s. Meter will be calibrated periodically in accordance with national standards or requirements.

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Management system and quality assurance

The monitoring plan presented in the PDD complies with the requirements of the applicable methodology. The validation team has verified all parameters in the monitoring plan against the requirements of the methodology and no deviations have been found.

The management system and quality assurance procedures have been reviewed by the validation team through document review and interviews with the project participants. The project participant would train all the monitoring staff well trained against with related requirement; the training record is saved and verified.

The monitoring plan outlines in the PDD includes:

- Monitoring Organization
- Monitoring Equipment and Installation
- Calibration & Maintenance Procedures
- Emergency procedures
- Data Management

As discussed above, CTI can confirm that the monitoring plan based on the

approved monitoring methodology AM0009 V7.0 is included and correctly presented in Section B.7 of the PDD. It is concluded that the monitoring arrangements described in the monitoring plan are feasible, meet the requirements by the applied methodology AM0009 version 07.0, and the project participant is able to implement the monitoring plan.

Projection and adjustment of project and baseline emissions on the basis of oil production

As per the requirements by the applied methodology AM0009 version 07.0.0, the validating DOE shall confirm that estimated emission reductions reported in the CDM-PDD are based on estimates provided in the survey used for defining the terms of the underlying oil production project as per the relevant documents such as production sharing contract, data room and operational production plan approved by national authority, etc.

As per the statement from Occidental dated 05/03/2019 /36/, the recovered gas volume was derived based on projected 10 years oil production volumes approved by Oman government /36/ and Gas/Oil Ratio (GOR) at Khamilah oil field area Block-27. The projected gross gains for the proposed CDM project were calculated through multiplying the expected oil production by the Gas/Oil Ratio (GOR) 0.0034726 MMSCFD/ BOPD at Khamilah oil field area Block-27. The 2020-2029 expected oil production volumes at Khamilah oil field area Block-27 are summarized in the table below, which was determined as per operational production plan and allowance production negotiated with the government:

2019 Oil production forecast (in BOPD)

	Khamilah
31-Dec-20	10,000
31-Dec-21	10,000
31-Dec-22	9,700
31-Dec-23	9,700
31-Dec-24	7,500
31-Dec-25	6,000
31-Dec-26	5,000
31-Dec-27	4,000
31-Dec-28	2,500
31-Dec-29	2,300

The statement on estimated gas and gains/36/ have been provided to the validation team. CTI checked the production data for oil and associated gas and compared them with the oil production forecast and Gas/Oil Ratio as estimated, and was able to confirm that estimated emission reductions reported in the CDM-PDD are based on estimates as per operational production plan and allowance production negotiated with the government.

Therefore CTI was able to confirm the estimation of the baseline emissions is

	reasonable based on its local and sectoral knowledge.
Findings	CL 3: The project has been put into operation at time of on-site validation, please provide actual information for the flow meters and electric meters.
Conclusion	<p>Refer to CL 3 as above, it is responded satisfactorily as detailed in the below Appendix 4 of the report. CL 3 is closed.</p> <p>The validation team is convinced of compliance of the monitoring plan with the requirements of the monitoring methodology of AM0009 (Version 07.0). During the on-site assessment, the validation team interviewed the PP that the monitoring arrangements described in the monitoring plan are feasible within the project design. The emission reductions resulting from the proposed CDM project activity can be reported ex post and verified.</p> <p>In conclusion, the validation team confirms that the requirements in the applied methodology AM0009 (Version 07.0) and relevant tools are met. The project monitoring plan is in compliance with the monitoring methodology AM0009 (Version 07.0). It is the DOE's opinion that the project participant is able to implement the monitoring plan.</p>

D.5. Start date, crediting period type and duration

Means of validation	<p>CTI validation team assessed whether the project participants specified the start date and crediting period type and duration of the proposed CDM project activity in accordance with relevant requirements in the "CDM project standard for project activities":</p> <p>Start date of the proposed CDM project activity The start date of proposed project is 06/05/2019, on which the Purchase agreement of Gas Compressor, Motor and Process Air Cooler for Block-27 was signed, as discussed in section D.1 above. The validation team confirms that the start date is the first real action that was taken where the PP committed to expenditure according to the "Glossary: CDM terms".</p> <p>Expected operational lifetime It is stated in the PDD that the expected operational lifetime for the proposed project is 10 years. CTI validation team reviewed the main equipment compressor specifications and interviewed the personal, then was able to confirm that the compressors lifetime should be 10 years in case of well maintained and use age under relevant instructions. Thus, the 10 years expected operational lifetime is considered as appropriate for the proposed project by CTI.</p> <p>Type and duration of the crediting period The PP selected 10 years fixed crediting period with start date of 05/08/2020 in the revised PDD Version 03.0, and the duration of the crediting period is from 05/08/2020 to 04/08/2030, which is considered appropriate by validation team.</p>
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Findings	N/A
Conclusion	A fixed 10-year crediting period has been chosen for the project, starting from 05/08/2020 or registration date, whichever is later.

D.6. Environmental impacts

Means of validation	<p>In order to validate whether the PP have conducted an environmental impact assessment where necessary as per the relevant local/national regulations or requirements, CTI validation team performed site inspections during the site visit, interviewed with the Ministry of Oil & Gas of the Sultanate of Oman and the operator.</p> <p>It is clearly stated by Ministry of Oil & Gas and the operator that there are no binding national/regional regulations in Oman as to undertake an environmental impact assessment for the proposed project activity.</p> <p>The main regulation with regard to requirements to undertake an EIA in Oman is the Royal Decree No. 114/2001 issued the Law on Conservation of the Environment and Prevention of the Pollution/25/. The decree states as "The owner of any source or area of work which – according to the basis specified by the Ministry – may constitute an avoidable or curable risk to the environment, shall submit, prior to the application for the environmental permit, a detailed environmental impact assessment study confirming that the benefits of the source or area of work surpass the potential damage to the environment." And also "No permit shall be given to practice any activity, which may cause inevitable or incurable damage to the environment."</p> <p>The environmental permit granted to the operator for the exploration and production of oil & gas was issued on 03/09/2018 by Ministry of Environment and Climate Affairs/30/, according to Law on Conservation of Environment and Prevention of Pollution promulgated by Royal Decree No.13287.</p> <p>The project is located in landscape which has high sand dune area and gravel plains. There are no local residents next to the project site. Thus, the project has limited impacts on local residents. Furthermore, the project has been built on an existing oil field for which an environmental impact assessment had already been approved by Omani Government.</p> <p>The project participant listed the potential environmental impacts identified in the PDD, such as air quality, noise, and solid waste, and then analyzed the issues respectively. Since air pollution will be significantly reduced due to the project activity as a result of associated gas recovery and utilization; the project is located in remote area, where no surrounding resident, therefore noise from the project activity is not significant harmful to the environment; The field itself already has a treatment system for solid waste, the impact of solid waste on the environment is limited. The impacts during construction are short-term, and some are mitigated through appropriate preventive and mitigation measures.</p>
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	As discussed above, CTI can confirm that the proposed project activity has no significant negative impacts on the ambient environment during the construction and operation period. Therefore, the proposed project activity does not have significant negative environmental impact.
Findings	N/A
Conclusion	The validation team concludes that the proposed project activity does not have significant negative environmental impact, which is transparently stated in the PDD. To confirm the impact associated with the project proponent, the validation team has physically inspected during the on-site visit and interview with the PPs and operator. It is validation team's opinion that the project activity does not cause any adverse environmental impacts, which is confirmed from the local official expertise.

D.7. Local stakeholder consultation

Means of validation	The local stakeholder survey was carried out on 27/04-28/04/2019 by the Health and Safety Department of the Operator on-site. The project activity is located in the middle of the Omani desert on an existing oil field, while the nearest town is far away. Only one small tribe leaves nearby. All men from the tribe are employed on project site at the oil field and the tribe mainly consists of members of the same family. Therefore no formal written invitation for comments was considered necessary nor practical or most efficient, and the members of the tribe were informed orally in an open and transparent manner by the Health and Safety Department of the Operator on-site. Questionnaires were distributed that contained a description of the project activity and reasonable time for comments was given. Totally 20 questionnaires /48/ were collected. The survey results and statistics analysis are presented in section E.1 and E.2 of the PDD. The survey demonstrates that all respondents fully support the project without any negative opinion towards the project. The implementation of the project could benefit the local in aspects of ecological environment protection and economic development. The validation team hereby confirms that the local stakeholder consultation is observed to be adequate.
Findings	N/A
Conclusion	The validation team considers the local stakeholder consultation carried out adequately. No comments received by the stakeholders and questionnaire survey summary is described in the PDD adequately.

D.8. Sustainable development co-benefits

Means of validation	N/A
Findings	N/A
Conclusion	N/A

D.9. Approval

Means of validation	As per the requirements by Project standard version 2.0, The project participants
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	<p>shall obtain a letter of approval from the designated national authority (DNA) of each Party involved in the proposed CDM project activity.</p> <p>The Sultanate of Oman is the only party involved in the project activity and is the Host Party for this project activity. And the Ministry of Environment & Climate Affairs acts as the CDM-DNA of the Sultanate of Oman. The LoA approved on 07/06/2020 has been provided to validation team for review. The validation team confirmed the followings in relation to the approval of the project activity:</p> <ul style="list-style-type: none"> - Host country (the Sultanate of Oman) is a party to the Kyoto protocol; - The participation in the CDM project activity is voluntary; - The project under validation contributes to the sustainable development of the Sultanate of Oman; - The project title same to that mentioned in the PDD. <p>LoA has been verified to be unconditional with respect to all the above confirmed aspects.</p> <p>The PP received the Host Country Approval from DNA, the Ministry of Environment & Climate Affairs. For verification of the authenticity of the approval, the validation team checked the UNFCCC Website and reviewed the official e-mail from the issuing office to find them consistent.</p>
Findings	CAR 5: The LoA from the DNA shall be provided to validation team for review.
Conclusion	<p>Refer to CAR 5, LoA was provided, thus CAR 5: is closed.</p> <p>The validation team has confirmed that the LoA has met the requirements of paragraph 140-144 of the CDM VVS for project activity version 02.0.</p>

D.10. Authorization

Means of validation	<p>The participant of the project activity is the Government of the Sultanate of Oman, presented by the Ministry of Oil & Gas with host country the Sultanate of Oman. The information regarding to the project participants are listed in section A.4 of the PDD and are consistent with the contact details provided in Appendix 1 of the PDD.</p>
Findings	CAR 5: The LoA from the DNA shall be provided to validation team for review.
Conclusion	<p>Refer to CAR 5, LoA was provided, thus CAR 5 is closed.</p> <p>CTI confirms participation of the Government of the Sultanate of Oman, presented by the Ministry of Oil & Gas in the project activity has been approved by DNA of the Sultanate of Oman, which is a Party to the Kyoto Protocol. The assessment team confirms that: The participation of project participant has been approved/ authorized by the DNA of host Party (the Sultanate of Oman)</p> <p>The participation has been confirmed in the LoA itself, which contains the name of the PPs to which it is issued. The information is consistent within the project documentation viz., PDD, LoA and signed MoC. The validation of authorization has been done on the basis of paragraph 147-15 of CDM VVS for project activity version 02.0 and assessment team confirms that the proposed project activity meets the requirement of paragraph 151 of CDM VVS for project activity version</p>

	02.0.
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D.11. Modalities of communication

Means of validation	Interview with the PP and verification of the MoC
Findings	CAR 6: The MoC signed by all project participants shall be provided to the Validation Team for review
Conclusion	Refer to CAR 6 above, MoC was provided CAR 6 is closed. The MoC of the project participant has been compiled as per the standardized MoC Form (Version03.0) /7/. The validation team confirms that the information of the project participants indicated in the MoC is consistent with that in PDD Appendix 1.

D.12. Global stakeholder consultation

Means of validation	Checking UNFCCC website
Findings	N/A
Conclusion	<p>The PDD, version 01.0 dated 28/11/2019 was made publicly available by CTI on the CDM website: https://cdm.unfccc.int/Projects/Validation/DB/XWZF3175XBUDDFC0WD35UBCZS11233/view.html</p> <p>Parties, stakeholders and NGOs were therefore through the CDM website invited to provide comments during a 30-day-period from 30/11/2019 to 29/12/2019. During the global stakeholder consultation period, no comments regarding this project were received. The PDD version 01.0 dated 28/11/2019 was withdrawn on 01/07/2020 due to the change of PP for which CTI have a contractual obligation.</p> <p>Following the withdrawal, the PDD, version 2.0 dated 02/07/2020 was made publicly available by CTI on the CDM website: https://cdm.unfccc.int/Projects/Validation/DB/CSJ6TEMH9P2N2692IA60GCPZ7OYKKV/view.html</p> <p>The PDD version 2.0 corrected the typo errors in PDD version 01.0 such as the recovered gas volume, emission reduction volumes, etc and revised the project participant. The project title was updated as per the LoA issued by Ministry of Environment & Climate Affairs of the Sultanate of Oman/5/.</p> <p>Parties, stakeholders and NGOs were therefore through the CDM website invited to provide comments during a 30-day-period from 03/07/2020 to 01/08/2020. During the global stakeholder consultation period, no comments regarding this project were received.</p>

SECTION E. Internal quality control

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The final validation report has undergone a technical review by a qualified independent reviewer before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with CTI Certification's qualification scheme for CDM validation and verification that meets the criteria of EB guidelines for qualification.

SECTION F. Validation opinion

>>

Shenzhen CTI International Certification Co., Ltd (CTI) has performed a validation of the project activity "Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman" in The Sultanate of Oman. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism as well as criteria given to provide for consistent project operations, monitoring and reporting.

The report is based on the assessment of the project design document undertaken through stakeholder consultations, application of standard auditing techniques including but not limited to document reviews, site visit, stakeholder interviews, review of the applicable methodology and its underlying formulae and calculations.

The host Party The Sultanate of Oman fulfils the participation criteria and has approved the project and authorized the project participant The Government of the Sultanate of Oman, represented by the Ministry of Oil & Gas. The DNA from The Sultanate of Oman confirmed that the project assists in achieving sustainable development. No project participant from Annex I Party has yet been identified in the validation stage.

The project correctly applies the baseline and monitoring methodology AM0009 (Version 07.0), "Recovery and utilization of gas from oil fields that would otherwise be flared or vented".

Through associated gas recovery and processing project activity located at Khamilah oil field at Block-27, Wilayat Ibri of Al- Dhahirah Governorate, the Sultanate of Oman, the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity. The total emission reductions from the project are estimated to be on the average 432,416 tCO_{2e} per year over the selected 10 years fixed crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is CTI's opinion that the project participants are able to implement the monitoring plan.

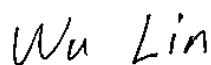
In summary, it is CTI's opinion that the project activity "Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman" in The Sultanate of Oman, as described in the PDD, version 03.0 dated 02/08/2020 meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology AM0009 (Version 07.0). Hence, CTI requests the registration of the project as a CDM project activity.



Mr. Peter Huang

Team Leader

03/08/2020



Mr Wu Lin

Technical Reviewer

03/08/2020

Appendix 1. Abbreviations

Abbreviations	Full texts
BE	Baseline Emissions
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CL	Clarification request
CNY	Chinese Yuan
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CTI	Shenzhen CTI International Certification Co., Ltd
DNA	Designate National Authority
DOE	Designated Operational Entity
EB	Executive Board
EDL	Électricité du Laos
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	Greenhouse gas(es)
GOL	Government of the Sultanate of Oman
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IPP	INDIGENOUS PEOPLES PLAN
kW	Kilo Watt
kWh	Kilo Watt Hour
LoA	Letter of Approval
NGL	Natural Gas Liquids
NGO	Non-governmental Organization
ODA	Official Development Assistance
OM	Operation Margin
PAR	Project Authorization Request
PDD	Project Design Document
PS	Project Standard
tCO ₂ e	Tonnes of CO ₂ equivalents
UNFCCC	United Nations Framework Convention on Climate Change
USD	US Dollar
VVS	Clean Development Mechanism Validation and Verification Standard
EPC	Equipment Purchase and Construction

Appendix 2. Competence of team members and technical reviewers

Mr. Peter Huang

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	√	√	√	√	√	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.1: Thermal energy generation
	TA 1.2: Energy generation from renewable energy sources
SS 2: Energy distribution	TA 2.1: Electricity distribution
SS 3: Energy demand	TA 3.1: Energy demand
SS 4: Manufacturing industries	TA 4.1: Cement and lime production
SS 5: Chemical industry	TA 5.1: Chemical industry
	TA 5.2: Caprolactam, nitric and adipic acid
SS 9: Metal production	TA 9.2: Iron, steel and Ferro-alloy production
SS 10: Fugitive emissions from fuels (solid, oil and gas)	TA 10.1: Fugitive emissions from oil and gas
SS 12: Solvents use	TA 12.1: Chemical industry
SS 13: Waste handling and disposal	TA 13.1: Solid waste and wastewater
	TA 13.2: Manure

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI

Approved by:

Wu LIN

Wu Lin

General Manager

Shenzhen, 02/01/2019

Mr. Wu LIN

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	√	√	√	√	√	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.1: Thermal energy generation
	TA 1.2: Energy generation from renewable energy sources
SS 2: Energy distribution	TA 2.1: Electricity distribution
SS 3: Energy demand	TA 3.1: Energy demand
SS 4: Manufacturing industries	TA 4.1: Cement and lime production
SS 5: Chemical industry	TA 5.1: Chemical industry
	TA 5.2: Caprolactam, nitric and adipic acid
SS 10: Fugitive emissions from fuels (solid, oil and gas)	TA 10.1: Fugitive emissions from oil and gas
SS 11: Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	TA 11.1: Emissions of fluorinated gases
	TA 11.2: Refrigerant gas production
SS 12: Solvents use	TA 12.1: Chemical industry
SS 13: Waste handling and disposal	TA 13.1: Solid waste and wastewater
	TA 13.2: Manure

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Lu ZHOU



General Manager

Shenzhen, 01/01/2018

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
/1/	PP	PDD initially published	Date: 28/11/2019 Version: 01.0 Date: 02/07/2020 Version: 02.0	PP
/2/	PP	PDD Final Version	Date: 02/08/2020 Version: 03.0	PP
/3/	PP	IRR Calculation Spreadsheet	Date: 02/08/2020 Version: 03.0	PP
/4/	PP	Emission Reduction Calculation Spreadsheet	Date: 02/08/2020 Version: 03.0	PP
/5/	Sultanate of Oman Ministry of Environment and Climate Affairs (the CDM-DNA of the Sultanate of Oman)	Letter of Approval from the Host Country	Dated: 07/06/2020	Other
/6/	PP	Modalities of Communication for Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman	Dated: 10/06/2020	PP
/7/	CDM Executive Board	Modalities of Communication Form (F-CDM-MOC), version 03.0	Dated 23/05/2017	Other
/8/	CDM Executive Board	CDM validation and verification standard for project activities, Version 02.0	Dated 29/11/2018	Other
/9/	CDM Executive Board	CDM project standard for project activities, version 02.0.	Dated 29/11/2018	Other
/10/	CDM Executive Board	CDM project cycle procedure for project activities, version 02.0	Dated 29/11/2018	Other
/11/	IPCC	IPCC 2006 Guidelines for National Greenhouse Gas Inventories.	https://www.ipcc-nggip.iges.or.jp/public/2006gl/	Other
/12/	CDM Executive Board	Project Design Document Form	Dated 31/05/2019	Other

No.	Author	Title	References to the document	Provider
	Board	CDM-PDD-FORM, Version: 11.0		
/13/	CDM Executive Board	Large-scale Methodology: AM0009 Recovery and utilization of gas from oil fields that would otherwise be flared or vented (Version 07.0)	Dated: 08/11/2013	Other
/14/	CDM Executive Board	Methodological tool: Combined tool to identify the baseline scenario and demonstrate additionality	Dated: 22/09/2017 Version: 07.0.0	Other
/15/	CDM Executive Board	Methodological tool: Tool for the demonstration and assessment of additionality	Dated: 23/11/2012 Version: 07.0.0	Other
/16/	CDM Executive Board	Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	Dated: 22/09/2017 Version: 03.0	Other
/17/	CDM Executive Board	Methodological tool: Common practice	Dated: 03/06/2015 Version: 3.1	Other
/18/	CDM Executive Board	Methodological tool: Investment analysis	Dated: 28/11/2019 Version: 10.0	Other
/19/	CDM Executive Board	Glossary: CDM terms	Dated: 12/09/2019 Version: 10.0	Other
/20/	The PP and Carbon Resource Management SA.	Carbon Asset Development Agreement (CADA)	Dated: 28/03/2019	PP
/21/	The World Bank	Regulation of Associated Gas Flaring and Venting Overview	http://documents.worldbank.org/curated/en/590561468765565919/pdf/295540Regulati1aring0no10301public1.pdf	PP
/22/	ISO	ISO 6976: Natural gas-Calculation of calorific values, density, relative density and Wobbe indices from composition	1995 and 2016 version	PP
/23/	Ministry of Regional Municipalities, Environment and Water Resources	Regulations for Air Pollution Control from Stationary Sources	http://extwprlegs1.fao.org/docs/pdf/oma097375E.pdf	PP
/24/	PP and operator	Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the	05/03/2019	PP

No.	Author	Title	References to the document	Provider
		Sultanate of Oman(investment decision)		
/25/	Oman government	Royal decree N 114 2011	http://www.vertic.org/media/National%20Legislation/Oman/OM_Law_Conservation_Environment_114-2001.pdf	PP
/26/	The World Bank	World Bank Top 30 flaring countries - table (2014 - 2018)	https://www.worldbank.org/en/programs/gasflaringreduction#7	PP
/27/	Occidental of Oman, Inc.	Gas shrinkage factor statement	N/A	PP
/28/	Occidental of Oman, Inc.	Liquid gain statement	N/A	PP
/29/	Occidental of Oman, Inc.	Technical specifications	December, 2019	PP
/30/	Al Dhahirah Wilayat, Ibri Government	Environmental Permit of Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman	Dated: 03/09/2018 Activity: Development of Block-27	PP
/31/	Occidental of Oman, Inc.	Purchase agreement of Gas Compressor, Motor and Process Air Cooler for Block-27	06/05/2019	PP
/32/	Occidental of Oman, Inc.	PAR information of purchase and installation of associated gas recovery and utilization system	N/A	PP
/33/	Energy Machine Services LLC.	The construction start notification letter	02/06/2019	PP
/34/	Sultanate of Oman Tax Authority	Income Tax Law	https://tms.taxoman.gov.om/portal/tax-laws	PP
/35/	PwC Middle East	2019 Oman State Budget: "A prudent budgetary approach"	https://www.pwc.com/m1/en/services/tax/me-tax-legal-news/2019/2019-oman-state-budget.html	PP
/36/	Occidental of Oman, INC.	Statement gas and gains	05/03/2019	PP
/37/	Occidental of Oman, Inc.	Training records	Jan 2020	PP
/38/	Occidental of Oman,	CDM Monitoring Training manual	Jan 2020	PP

No.	Author	Title	References to the document	Provider
	Inc.			
/39/	PP	CDM project activity prior consideration Form to EB, Oman DNA, and confirmation from DNA	https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html	PP
/40/	Occidental of Oman, Inc.	Gas analysis report	Reported date: 08/10/2019	PP
/41/	Occidental of Oman, Inc.	Actual Oil, gas and liquid statement	Dated: 01/06/2020	PP
/42/	Occidental of Oman, Inc. and engineering service company	Compressor invoice	Dated: 06/06/2019	PP
/43/	Occidental of Oman, Inc. and engineering service company	Electrical facilities invoice	Dated: Jun 2019	PP
/44/	Occidental of Oman, Inc. and maintenance service company	Invoice for Maintain cost Jan 2020	12/02/2020	PP
/45/	Occidental of Oman, Inc. and Oman government	Gas sales and purchase agreement (GSPA)	Dated: 01/01/2020	PP
/46/	PP	Key parameters of Similar CDM projects	N/A	PP
/47/	PP	Note for Exploration and Production sharing agreement between operator and Oman Government	05/03/2019	PP
/48/	Occidental of Oman, Inc.	Questionnaire survey records	28/04/2019	PP
/49/	Oman society for Petroleum Services	Oman Oil and Gas concession boundaries	https://opaloman.org/wp-content/uploads/2019/02/Concession_map-16.01.2019.pdf	PP
/50/	Ministry of Oil & Gas	Confirmation on the common practice analysis for the oil and gas concession blocks in Oman	N/A	PP
/51/	World Bank Group- IFC	IFC Provides \$40 Million to Mazoon Petrogas SAOC in Oman	https://ifcextapps.ifc.org/ifcext/pressroom/ifcpressroom.nsf/1f70cd9a07d692d685256ee1001cdd37/391f8b6de1ab507b8	PP

No.	Author	Title	References to the document	Provider
			5256fb8007c7d08	
/52/	CDM Executive Board	The list of prior consideration notifications on the UNFCCC CDM website	https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html	Other
/53/	Experts on oil and gas regulations	Oil and Gas Regulation in Oman	Jun 2018	Other
/54/	Rabah Arezki and Ha Nguyen	Coping with a Dual Shock: COVID-19 and Oil Prices	https://www.worldbank.org/en/region/mena/brief/coping-with-a-dual-shock-coronavirus-covid-19-and-oil-prices	Other
/55/	Oman society for Petroleum Services	Information for common practice	Refer to the appendix 6 in PDD	Other
/56/	PP	Exploration and Production sharing agreement between operator and Oman Government	Dated: 01/01/2020	PP
/57/	PP	PDD, IRR spreadsheet and validation report of PA 6817	https://cdm.unfccc.int/Projects/DB/BVQI1343120764.64/view	Other

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. CLs from this validation

CL ID	CL 1	Section no.	D.3	Date: 02/08/2020
Description of CL				
It is requested to provide a figure to illustrate the project pipeline system, and describe the detailed information of the installations, technologies employed by the proposed project in section A.4.3 in PDD.				
Project participant response				Date: 02/08/2020
According to the latest CDM-PDD-FORM (Version 11.0, 31 May 2019), the technologies/measures to be employed and/or implemented by the project activity should be described in section A.3. Therefore section A.3 in PDD Version 03.0 has been revised, technologies/measures information (including the figure to illustrate the project pipeline system, and describe the detailed information of the installations, technologies) has been added.				
Documentation provided by project participant				
PDD Version 03.0				
DOE assessment				Date: 03/08/2020

PP revised and provided the updated PDD, and provided technologies/measures information (including the figure to illustrate the project pipeline system, and describe the detailed information of the installations, technologies).
This has been confirmed and accepted by the validation team. CL 1 was closed.

CL ID	CL 2	Section no.	D.4.5	Date: 02/08/2020
Description of CL				
Project participants are requested to follow the requirements of sub-steps in step 1 of the “Combined tool to identify the baseline scenario and demonstrate additionality” version 07.0, to list all plausible alternative scenarios to the proposed project activity, and then analysis the consistency with mandatory applicable laws and regulations.				
Project participant response				Date: 02/08/2020
According to the “Combined tool to identify the baseline scenario and demonstrate additionality” version 07.0, “Step 1b: Consistency with mandatory applicable laws and regulations” and relative discussion has been added into section B.4.				
Step 1b: Consistency with mandatory applicable laws and regulations				
All the realistic and credible alternative scenarios (Scenario (a) and Scenario (b)) outlined above are permitted by law or other industrial agreements and standards in Oman. There are no laws or other regulations (e.g. environmental regulations) which implicitly restrict some of the alternatives. This is evidenced in the report “Regulation of Associated Gas Flaring and Venting, A Global Overview and Lessons from International Experience” published by the Global Gas Flaring Reduction Public-Private Partnership of the World Bank , which states that for the Sultanate of Oman: The operator may “lift, process, and market associated gas jointly with the national oil company, subject to a negotiated gas agreement” and “use associated gas in operations or reinject or flare gas, subject to relevant consents”. Besides, the report further explains that: “Permission to flare gas that cannot be marketed and that exceeds operational requirements is granted by the minister’s written consent. Permission is not required to flare during normal well testing”. In addition, associated gas flaring at Khamilah Oil field at Block-27 (existing scenario prior to the proposed project activity) does not violate the emissions standards as prescribed by the Ministerial Decision 5/86 of May 17 1986 that “Dark Smoke-products of combustion shall not emit smoke as dark as or darker than shade 1 on the Ringelmann Scale. (20% opacity)”, and that “sulfur recovery units must achieve at least 95% efficiency”, as evidenced by the environmental permit issued on September 3rd, 2018 by Ministry of Environment and Climate Affairs according to Law on Conservation of Environment and Prevention of Pollution promulgated by Royal Decree.				
Outcome of step 1b: Scenario (a) and Scenario (b) are plausible.				
PDD has been updated accordingly.				
Documentation provided by project participant				
PDD Version 03.0				
DOE assessment				Date: 03/08/2020
PP revised and provided the updated PDD. Based on information in the updated PDD, supporting documentation, referred sources and review of similar CDM projects, CTI confirms that the approved baseline methodology has been correctly applied for baseline identification. The PDD provides a verifiable description of the identified baseline scenario, including a description of the employed technology and				

related activities. The baseline scenario is justified to be the same as the scenario existing prior to the start of implementation of the proposed project activity, the flaring of associated gas at the oil production site, continuation of the operation of the existing oil and gas infrastructure without any other significant changes, and the use of gas for gas-lift system from the same source and quantity as under the project activity. The Additionality Tool was applied correctly. No reasonable alternative scenario has been overlooked in the context of the proposed CDM project activity. Relevant sectoral policies and circumstances related to the flaring associated petroleum gas in Oman have been considered and listed in the PDD.

By checking the PDD and AM0009 (Version 07.0), the validation team confirms the baseline scenario was correctly described in the PDD. **CL 2** was closed.

CL ID	CL 3	Section no.	D.4.8	Date: 02/08/2020
Description of CL				
The project has been put into operation at time of on-site validation, please provide actual information for the flow meter and electric meter.				
Project participant response				Date: 02/08/2020
PDD was updated to include the actual information for the flow meters and electric meters based on the on-site inspection.				
Documentation provided by project participant				
PDD Version 03.0				
DOE assessment				Date: 03/08/2020
PP revised and provided the updated PDD. Actual information for the flow meters and electric meters including the locations of the meters, accuracy of the meters, monitoring responsible department were added in the updated PDD, which is confirmed consistency through the on-site inspection and interview5 by validation team.				
CL 3 was closed.				

Table 2. CARs from this validation

CAR ID	CAR 1	Section no.	D.1	Date: 02/08/2020
Description of CAR				
The proposed project activity with a start date of 06/05/2019, which is prior to the date of PDD publication for global stakeholder consultation on 30/11/2019. The project participants are requested to demonstrate that the CDM was seriously considered in the decision to implement the project activity as per CDM project standard for project activities version 02.0. In doing so, please provide: a) evidence of their awareness of the CDM prior to the start date of the project activity, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project activity; b) evidence that continuing and real actions were taken to secure the CDM status for the project activity in parallel with its implementation, c) an implementation timeline of the project activity.				
Project participant response				Date: 02/08/2020
1) As per para 33 of "CDM project standard for project activities" Version 2.0, EB 101, paragraph 32, "For a				

proposed CDM project activity with a start date on or after 2 August 2008, project participants shall inform the host Party's designated national authority (DNA) and the UNFCCC secretariat, in writing of the commencement of the project activity and their intention to seek the CDM status for the project activity, or, through a DOE, publish the PDD for global stakeholder consultation, within 180 days of the start date in accordance with the "CDM project cycle procedure for project activities."

The proposed project started on 06/05/2019, and the PDD for publication date of the global stakeholder consultation is 30/11/2019. Therefore the project participants shall demonstrate that the CDM benefits were considered necessary in the decision to undertake the project as a CDM project activity.

The project participant estimated the financial indicators such as capital costs, gas price, liquid price, annual operational expenditures, expected recovered gas volume, expected liquid gain volume, net calorific value of the recovered gas income, tax rate, etc according to 2019 Oman State Budget, Taxation law in Oman, on-site operator reports, and the project participant's surveys, Oil and Gas Regulation in Oman, and Oman financial regulations, etc. The financial indicator of investment analysis shows that the equity IRR of the project is lower than the benchmark IRR of 7.37% (after-tax) and the project financially unviable.

On 05 March 2019, the project participant held a board meeting. In the meeting, the board discussed and confirmed the financial indicators for the equity IRR analysis, and concluded that without carbon revenue the project is not financially attractive, as the equity IRR after taxes is 7.37%, lower than the benchmark in Oman. Therefore, the project participant decided to construct the project under CDM support.

Following the Memo decision on 05 March 2019, and project participant signed Carbon Asset Development Agreement was signed with Carbon Resource Management S.A. on 28 March 2019 for to develop the proposed project as CDM project. Subsequently, Carbon Resource Management S.A. began to communicate with the project participant of the project details and did some carbon training for the project participant.

On 06 May 2019 the project owner signed Purchase Agreement of Gas Compressor, Motor, and Process Air Cooler of the proposed project. This is defined as the project start date.

On 02 June 2019, the construction of the project started as per the notification letter issued from the construction company to the project participant.

On July 2019, Carbon Resource Management S.A. performed site visit for information exchange, carbon communications and CDM training for the project participant.

Project participant the commencement of the project activity and their intention to seek the CDM status for the project activity to both Oman DNA (Ministry of Environment & Climate Affairs) and the UNFCCC on 29/09/2019 about the commencement of the project activity. This was done within 180 days of the start date of this project activity, which meets the requirement of prior consideration of CDM.

2) and 3), the implementation timeline and the related actions taken to secure the CDM status have been listed in Table B.9 in section B.5 in PDD Version 03.0.

The PDD has been updated accordingly.

Documentation provided by project participant

PDD Version 03.0

The following documents and evidence has been provided:

- 1) Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman(investment decision)

2) Purchase agreement of Gas Compressor, Motor and Process Air Cooler for Block-27	
3) PAR information of purchase and installation of associated gas recovery and utilization system	
4) The construction start notification letter	
5) Prior consideration Form to EB, Oman DNA, and confirmation from DNA	
6) Carbon Asset Development Agreement (CADA)	
DOE assessment	Date: 03/08/2020
<p>PP revised and provided the updated PDD. By reviewing the updated PDD and the evidence provided by PP, the validation team confirms that the CDM was seriously considered by the PP, and real and continuing actions were taken to secure the CDM status for the project activity in parallel with its implementation. The evidences were transparently reviewed by the validation team and considered to be effective.</p> <p>CAR 1 was closed.</p>	

CAR ID	CAR 2	Section no.	D.4.6	Date: 02/08/2020
Description of CAR				
<p>Regarding the input parameters applied in investment analysis and project IRR calculations, corrective action is requested to: 1) list the main parameters and data source for relevant input values in published PDD version 01; 2) demonstrate all input values used in investment analysis is valid and applicable at the time of the investment decision taken by the project participant; 3) please provide other data source and/ or evidence for the purpose of cross check; 4) Please provide the investment analysis spreadsheet presented in a transparent manner, with readable formulas, all relevant cells are viewable and unprotected.</p>				
Project participant response				Date: 02/08/2020

<p>1) The main parameters and data source for relevant input values has been listed in Table B.4. Basic data for Equity IRR calculation in the revised PDD Version 03.0.</p> <p>2) The Memo on Associated Gas Recovery and Utilization Project at Khamilah on 05/03/2019 is deemed to be the time of the investment decision taken by the project participant.</p> <p>The input value of Capital expenditures has been demonstrated from “Memo on Associated Gas Recovery and Utilization Project at Khamilah Station” provided by the project participant, the input value of Annual Operational expenditures is calculated by the operator.</p> <p>The input value of projected quantity of gas recovered, gas used internally, and the gas sold over the project life time are estimated by the operator according to the oil production, compressor capacity, gas turbine efficiency, and the consumption of the captive power plant.</p> <p>The input value of agreed price for the delivery of recovered gas has been demonstrated from the “Communications with government, and Gas Purchase Agreement”, and the input value of the expected price for liquid gains comes from the Official oil price for budget purpose at investment decision, as per Oman State General 2019 Budget published on January 2019. The oil price dropped sharply in recently, it's highly unlikely to be increased. These two documents are all available at the time of the investment decision.</p> <p>The input value of the net calorific value of the recovered gas comes from the lab analyzes data..</p> <p>The input value of the income tax rate for Operator is in accordance with Oman Tax Law, which is a long-term stabilization value.</p> <p>The input value of the Project life time comes from the technical manual of the compressors.</p> <p>The detailed demonstration of all above input values used in investment analysis has been added in section B.5. with the sub-title of “Suitability of key input values” in PDD Version 03.0.</p> <p>3) Relative data source and/ or evidence has been provided to DOE.</p> <p>4) The equity IRR after taxes in PDD Version 01 contains an accounting error, the corrected IRR of 7.37% has been revised in PDD Version 03.0.</p> <p>5) The investment analysis spreadsheet which meets the requirements has been provided to DOE.</p>	
Documentation provided by project participant	
<p>PDD Version 03.0, IRR calculation spreadsheet version 03.0, ER spreadsheet version 03.0, and following document has been provided :</p> <ol style="list-style-type: none"> 1) Memo on Associated Gas Recovery and Utilization at Khamilah oil field area at Block-27 in Wilayat Ibri of the Sultanate of Oman(investment decision) 2) Gas shrinkage factor statement 3) Liquid gain statement 4) Technical specifications 5) Tax TIES: Oman - Overview and introduction 6) 2019 Oman State Budget: “A prudent budgetary approach” 7) Statement gas and gains 8) Gas analysis report 9) Gas sales and purchase agreement (GSPA) 	
DOE assessment	Date: 03/08/2020

By reviewing the updated PDD and the evidence provided by the PP, the validation can confirm: all input parameters and data source for the input values are valid and applicable at the time of investment decision, and considered reasonable. The validation team has cross checked the evidence for the investment analysis, and confirmed the IRR calculations provided and are transparent and reproducible.
CAR 2 was closed.

CAR ID	CAR 3	Section no.	D.4.6	Date: 02/08/2020
Description of CAR				
Regarding the sensitivity analysis in PDD, it is requested to: 1) list the key parameters that constitute more than 20% of either total project costs or total project revenues; 2) present the results of key parameters subjected to reasonable variation, at least cover a range of +10% and –10%; 3) analysis the likelihood of the occurrence of parameters variation to reach or over the benchmark as per “Methodological tool: Investment analysis”.				
Project participant response				Date: 02/08/2020
Detailed sensitivity analysis, including the calculation result table (cover a range of +10% and –10%) (<i>Table B.7. Sensitivity analysis: impact of variations in assumptions on the IRR</i>), figure (<i>Figure B.3. Results of the sensitivity analysis</i>), and each key parameter's analysis (<i>Table B.8. Critical analysis: Variation at which IRR equates the benchmark</i>) has been added into section B.5 in PDD Version 03.				
Documentation provided by project participant				
PDD Version 03.0 IRR calculation spreadsheet version 03.0				
DOE assessment				Date: 03/08/2020
The validation team reviewed the updated PDD and confirms that the sensitivity analysis is in accordance with the “Tool for demonstration and assessment of additionality” (version 07.0.0) and “Methodological tool: investment analysis” version 10.0. The justifications provided by the PP with the variations of these parameters are accepted by CTI.				
CAR 3 was closed.				

CAR ID	CAR 4	Section no.	D.4.6	Date: 02/08/2020
Description of CAR				
The proposed project is a large-scale CDM project activity, and not a first of its kind. Please take a step-wise approach to conduct a common practice analysis as per the requirements by Project standard.				
Project participant response				Date: 02/08/2020
In order to identify all plants delivering the same output as the proposed project, all the oil and gas concessions in the Sultanate of Oman was listed and discussed, based on concession boundaries from officially publicly available source Oman society for Petroleum Services.				
Following the steps of common practice, it can be concluded that the proposed project is not a ‘common practice’ within the sector in the applicable geographical area. The requirements of the common practice analysis are fulfilled and the project is additional.				
Please refer to the updated PDD.				

Documentation provided by project participant	
PDD Version 03.0	
The following documents and evidence has been provided:	
1) Oman Oil and Gas concession boundaries 2) Confirmation on the common practice analysis for the oil and gas concession blocks in Oman from Ministry of Oil & Gas 3) IFC Provides \$40 Million to Mazoon Petrogas SAOC in Oman 4) Original source of information for each block is displayed in Table Appendix-6 of Annex 3	
DOE assessment	Date: 03/08/2020
By reviewing the update PDD and documents and evidence provided by PP, CTI confirm the proposed project is not a 'common practice' within the sector in the applicable geographical area. The requirements of the common practice analysis are fulfilled and the project is additional.	
CAR 4 was closed.	

CAR ID	CAR 5	Section no.	D.9 D.10	Date: 02/08/2020
Description of CAR				
The LoA from the DNA shall be provided to validation team for review.				
Project participant response				Date: 02/08/2020
The LOA was issued by Sultanate of Oman Ministry of Environment and Climate Affairs (the CDM-DNA of the Sultanate of Oman) 07/06/2020 has been provided to the validation team.				
Documentation provided by project participant				
The LOA was issued by Sultanate of Oman Ministry of Environment and Climate Affairs.				
DOE assessment				Date: 03/08/2020
The Sultanate of Oman is the only party involved in the project activity and is the Host Party for this project activity. And the Ministry of Environment & Climate Affairs as the CDM-DNA of the Sultanate of Oman. The LoA has been provided to validation team for review. For verification of the authenticity of the approval, the validation team checked the UNFCCC Website and reviewed the official e-mail from the issuing office to find them consistent.				
CAR 5 was closed.				

CAR ID	CAR 6	Section no.	D.11	Date: 02/08/2020
Description of CAR				
The MoC signed by all project participants shall be provided to the Validation Team for review.				
Project participant response				Date: 02/08/2020
The signed MoC form has been provided the validation team.				
Documentation provided by project participant				
Signed MoC has been provided.				
DOE assessment				Date: 03/08/2020

The validation team confirms that the information of the project participants indicated in the MoC is consistent with that in PDD Appendix 1 and complies with standardized MoC Form.

CAR 6 was closed.

Table 3. FARs from this validation

FAR ID	NA	Section no.	NA	Date: NA
Description of FAR				
NA				
Project participant response				Date: NA
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: NA
NA				

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM validation and verification standard for project activities” (CDM-EB93-A05-STAN); • Make editorial improvements.
03.1	11 January 2018	Editorial revision to remove an erroneously included instruction paragraph in section D.2 (Identification of project type).
03.0	31 October 2017	Revision to align with the requirements of the “CDM validation and verification standard for project activities” (version 01.0).
02.0	22 July 2016	EB 90, Annex 3 Revision to include provisions related to automatically additional project activities.
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Registration Keywords: project activities, validation report		