CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

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SECTION A. General description of project activity

A.1. Title of the project activity:

Project title: Associated Gas Recovery and Utilization at Block 9
PDD Version: 1.0

PDD completion date: 20/06/2011

Revision History:
Version 1.0: Submitted for global stakeholder comments.

A.2. Description of the project activity:

The Associated Gas Recovery and Utilization at Block 9 project consists of the recovery and utilization of natural gas found in association with oil at Block 9, Safah oil field, Sultanate of Oman. Block 9 is operated by Occidental of Oman Inc. under a development and production sharing agreement with the Ministry of Oil and Gas.

The recovery process comprises three main stages including the separation stage where gas is separated from oil and water, the compression stage where gas is compressed for transportation to gas plant, and the processing stage where gas is processed to fit with conditions of gas pipeline for further transportation to end-users, where the gas will be utilized to meet energy demand. Main equipment necessary for the proposed project activity comprises motor-driven reciprocating compressors installed at several locations on site.

The scenario existing prior to the start of the implementation of the proposed project activity is that associated gas would continue to be flared on site while non-associated gas or other fossil sources would be combusted to meet energy needs of end-users. 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.

The total estimated amount of associated gas to be recovered during crediting period is about 2.9 billion m^3 while average methane content is estimated at about 64.16%. The project activity is expected to reduce emissions by approximately 804,662 tonnes of CO_2 equivalent annually over the crediting period.

The proposed project activity will contribute to the Oman national and local sustainable development and also generates the following benefits:

- Benefit the local air conditions by reducing the air pollution due to flaring.
- Efficient use of natural resources due to the utilization of the gas that would be flared in the absence of the project.
- New job opportunities due to the construction activities.
- Reduce the combustion of fossil fuels at end-users that are produced from non-associated gas or other fossil sources.

A.3. Project participants:

The parties involved in the project are shown in Table A.1:

Table A.1. Project participants

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
The Sultanate of Oman (host)	The Government of the Sultanate of Oman, represented by the Ministry of Oil & Gas (public entity)	No
United Arab Emirates	Oman Trading International	No

For detailed information on participants in the project activities, please refer to Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

The Sultanate of Oman

A.4.1.2. Region/State/Province etc.:

A'Dhahirah Region

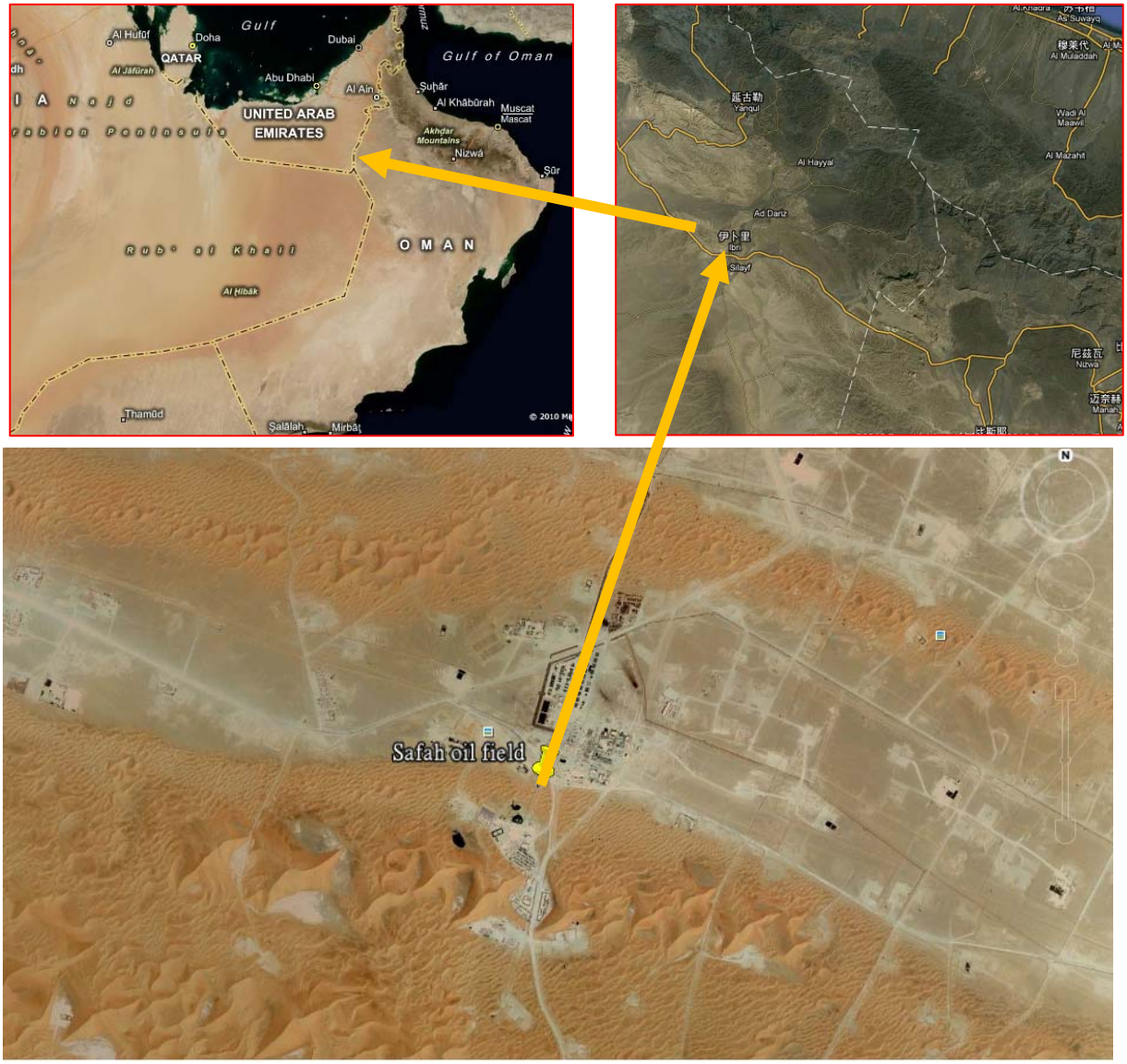
A.4.1.3. City/Town/Community etc.:

Safah oil field

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

The proposed project is located at Block 9, Safah oil field in A'Dhahirah Region of Northern Oman. Nearest town is Ibri which is about 50kilometres from the site. The site location's approximate coordinates are east longitude of 55°27'40" and north latitude of 23°11'20". Figure A.1 shows the location of the project.

Figure A.1 Map of the project location



A.4.2. Category(ies) of project activity:

The project activity falls within Sectoral scope 10: Fugitive emission from fuels (solid, oil, gas).

A.4.3. Technology to be employed by the project activity:

The proposed project activity aims to recover associated gas flow that is currently flared at 5 different locations in Safah oil field. Gas will be transported to a processing plant on-site where it will be processed then further transported and sold to gas pipeline.

The project activity will install 8 compressors at five different locations. Technology employed by the proposed project activity mainly includes but is not limited to the following equipment:

- Purchase and installation of a vapour recovery unit for the central production boot flare in Safah gas plant (SGP). The boot flare will be re-routed to the vapour recovery unit which will recover gas from the crude tank degassers and various other low pressure sources currently flared.
- Reduction of the Far West (FW) flare by a series of new pipelines and re-routes. Addition of electrical driven reciprocating compressor at the Satellite (SAT) facility as well as electrical infrastructures including transformers and relays to support the high voltage and low voltage demands of the compressor. A new motor control center and switch gear room will be installed. The recovered gas will be returned to the gas plant for processing.
- Addition of electrical motor driven reciprocating compressor at Jalal (JL) as well as electrical infrastructure including transformers and relays to support the high voltage and low voltage demands of the compressor. The recovered gas will be returned to the gas plant for processing.
- Addition of electrical motor driven reciprocating compressors at Wadi Latham (WL) as well as electrical infrastructure including new motor control center and switch gear building, transformers and relays to facilitate the high voltage and low voltage demands of the compressors. The recovered gas will be returned to the gas plant for processing
- Addition of electrical motor driven reciprocating compressors at Far West (FW) facility. The recovered gas will be returned to the gas plant for processing

The Safah field produces oil before and after the project activity, the oil production process will remain unchanged. The existing oil and gas infrastructure is to continue operation without processing of any recovered associated gas and any other significant changes. The scenario existing prior to the start of the implementation of the proposed project activity is that associated gas would continue to be flared on site while non-associated gas or other fossil sources would be combusted to meet energy needs of end-users in Oman.

Training and maintenance requirements: The staff of the project activity will receive the appropriate training on the operation of the associated gas recovery equipment and CDM related knowledge.

Implementation schedule: More specific details on the implementation schedule in Table A.2, including the "starting date of the project activity" and CDM consideration are provided in Table B.7.

Table A.2. Implementation schedule

Location	Number of compressors	Start construction	Operation
SGP	1	28-Mar-2009	28-Nov-2009
FW	2	01-Jul-2008	30-Jun-2010
SAT	1	28-Sep-2009	07-Sep-2010
JAL	1	28-Sep-2009	30-Sep-2010
WL	3	28 Sep 2009	30-Sep-2010

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

The estimation of the emission reductions in the crediting period is presented in Table A.3.

Table A.3. The estimation of the emission reductions in first crediting period

Year	The estimation of annual emission reductions (tCO2e)
Year 1: 01/01/2012 – 31/12/2012	1,664,144
Year 2: 01/01/2013 – 31/12/2013	1,504,227
Year 3: 01/01/2014 – 31/12/2014	1,192,550
Year 4: 01/01/2015 – 31/12/2015	855,571
Year 5: 01/01/2016 – 31/12/2016	721,812
Year 6: 01/01/2017 – 31/12/2017	530,431
Year 7: 01/01/2018 – 31/12/2018	415,127
Year 8: 01/01/2019 – 31/12/2019	358,094
Year 9: 01/01/2020 – 31/12/2020	0
Year 10: 01/01/2021 –31/12/2021	0
Total estimated reductions (tonnes of CO2e)	**7,241,956**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	804,662

A.4.5. Public funding of the project activity:

There is no public funding from Annex I countries available to the proposed project.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

The project activity uses the baseline and monitoring methodology AM0009/Version04: "Recovery and utilization of gas from oil wells that would otherwise be flared or vented".

This methodology also refers to the latest approved versions of the following tools:

"Tool to calculate project or leakage CO2 emissions from fossil fuel combustion";
"Tool to calculate baseline, project and/or leakage emissions from electricity consumption";
"Combined tool to identify the baseline scenario and demonstrate additionality";
"Tool for the demonstration and assessment of additionality".

Reference: UNFCCC website: http://cdm.unfccc.int/goto/MPappmeth

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

The baseline and monitoring methodology AM0009 Version 04 is applicable to the proposed project; because the project meets all the applicability criteria stated in the methodology:

The project activity is proposed to recover and utilise associated gas from oil wells (Block 9). In absence of the project, before the project activity, about half of the gas has been flared and the rest has been re-injected for the purpose of the gas lift process.

AM0009 is applicable under the following conditions:

- Under the project activity the recovered gas is:
  - Consumed on-site to meet energy demands; and/or
  - Transported to and compressed into a gas pipeline without prior processing; and/or
  - Transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensate) that are transported and sold to final consumer(s).

- *The gas will be transported to a processing plant and hydrocarbon products can be gained and finally sold to final consumer(s), while a small amount of recovered associated gas will be consumed on-site to meet energy demands.*

- The project activity does not lead to changes in the process of oil-production, such as an increase - in the quantity or quality of oil extracted, in the oil-wells within the project boundaries;

- *The process of oil-production in project boundary will not be changed due to the construction of the project.*

- The injection of any gases into the oil reservoir and its production system is allowed in the project activity only for the purpose of the gas-lift process;

- *The project activity includes the injection of associated gas into oil reservoir for gas-lift proposes. The associated gas injected into oil reservoirs will only for the purpose of gas-lift process.*

- 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 gas.

- *The project activity will be carried out in five different locations allowing recovery associated gas across the Block 9, which has been in operation before the project design.*

In addition, the applicability conditions included in the tools referred to above apply:

- The continuation of the current practice of either venting (scenario G1) or flaring (scenario G2) of the associated gas and/or gas-lift gas; and

- *The identified baseline scenario is the current practice of flaring (scenario G2) of the associated gas and /or gas-lift gas. Detailed description in section B.4.*

- The continued operation of the existing oil and gas infrastructure without processing of any recovered associated gas and/or gas-lift gas and without any other significant changes (scenario P4);

- *The identified baseline scenario is the continued operation of the existing oil and gas infrastructure (scenario P4). Detailed description is stated in section B.4.*

- In the case where gas-lift is used under the project activity: the gas-lift gas under the baseline uses the same source as under the project activity and the same quantity as under the project activity (scenario O1).

- *The identified baseline scenario is the same source as under the project activity and the same quantity as under the project activity (scenario O1). Please refer to section B.4 for details.*

According to the above, the project is therefore justified to be applicable to the methodology.

B.3. Description of the sources and gases included in the project boundary:

The spatial extent of the project boundary encompasses,

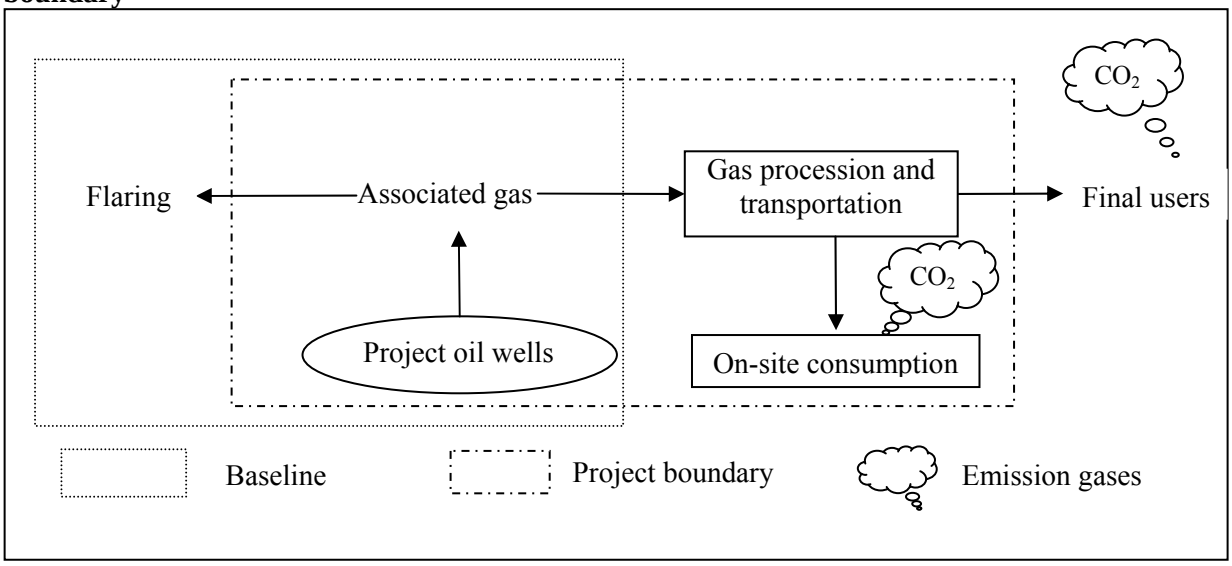
- The project oil reservoir and oil wells where the associated gas is collected;
- The site where the associated gas was flared or vented in the absence of the project activity;
- The gas recovery, pre-treatment, processing and transportation infrastructures, including where applicable, compressors;
- The source of gas-lift gas if any.

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table B.1 below.

Table B.1. Emission sources included in or excluded from the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Combustion of fossil fuels at end-users that are produced from non-associated gas or other fossil sources	CO_2	Yes	Main source of emissions in the baseline
		CH_4	No	Minor source, neglection is conservative
		N_2O	No	Minor source, neglection is conservative
Project Activity	Energy use for the recovery, pre-treatment, transportation, and if applicable, compression of the recovered gas	CO_2	Yes	Main source of emissions in the project
		CH_4	No	Assumed negligible
		N_2O	No	Assumed negligible

Figure B.1 Indicative emission sources and gases particularly applicable in project boundary



B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

According to AM0009 version 04, the project participant shall apply the following steps to identify the baseline scenario:

Step 1: Identify plausible alternative scenarios
Step 2: Evaluate legal aspects

Step 3: Evaluate the economic attractiveness of alternatives
Step 4: Common practice analysis

Step 1: Identify plausible alternative scenarios

For the identification of plausible alternative scenarios for the production and utilization of gas from oil wells, realistic and credible alternatives should be separately determined regarding according to AM0009 version 04:

- Alternative baseline scenarios for the associated gas and gas-lift gas from project oil wells
- Alternative baseline scenarios for oil and gas infrastructure;
- Alternative baseline scenarios for the use of gas-lift gas

Realistic and credible alternatives for each of these components are presented below:

Table B.2. Summary for baseline scenarios for the associated gas from project oil wells:

NO.	*Scenario description*	*Relevance to the proposed project activity*
G1	Release of the associated gas and/or gas-lift gas into the atmosphere at the oil production site (venting)	**Not plausible.** There is currently no law or regulation that prohibits the project owner from venting or flaring associated gas in Oman. However, venting the associated gas from oil wells is not common practice for safety reasons (to avoid the risks of explosions and intoxication) and for local environmental reasons. Thus, Option G1 is **not** considered an alternative.
G2	Flaring of the associated gas and/or gas-lift gas at the oil production site	**Plausible.** Prior to the project, associated gas has been flared. There is no local or national regulation in Oman that restricts from flaring the gas. A World Bank Report shows Oman has an upward trend in gas flaring over the time series[1]. Thus, Option G2 is considered an alternative.
G3	On-site use of the associated gas and/or gas-lift gas for power generation	**Not plausible.** The electricity demand is limited at the project site. There is no need for more electricity generation. In addition, there are no connection structures between the proposed project and the power grid or other users. Thus, Option G3 is **not** considered an alternative.
G4	On-site use of the associated gas and/or gas-lift gas for liquefied natural gas (LNG) production	**Not plausible.** No LNG plant exists near the production site. This option requires a LNG plant construction on site. While there are existing natural gas pipelines on the project site, it is not considered

[1] http://siteresources.worldbank.org/INTGGFR/Resources/DMSP_flares_20070530_b-sm.pdf

		economically attractive to construct a new LNG plant other than using the existing natural gas supply system. Thus, Option G4 is not considered an alternative.
G5	Injection of the associated gas and/or gas-lift gas into an oil or gas reservoir	**Not Plausible.** The purpose of re-injection is either for gas-lift application or for gas storage. In the event of gas-lift application, in absence of the project, half of the gas is flared and the rest is re-injected for the purpose of the gas lift process. While the plant has no more capacity, to re-inject the full amount of the associated gas is not applicable. There are no available oil fields for permanent storage in the project area. And in the event of storing the associated gas through re-injection of gas into a reservoir, expenditures on construction, equipments and other costs are high. While there is no revenue unless the gas is collected and sold out. Therefore, this option is not feasible. Thus, Option G5 is not considered an alternative.
G6	Recovery, transportation, processing of the associated gas and/or gas-lift gas and distribution of products thereof to end-users without being registered as a CDM project activity	**Plausible.** This option is technically and legally possible but economically unattractive, details have been discussed in section B.5.
G7	Recovery, transportation and compression of the associated gas and/or gas-lift gas into a gas pipeline without prior processing, without being registered as a CDM project activity	**Not Plausible.** The proposed project is to be connected to gas pipeline and gas finally transported long distance to households and/or industries. Hence prior processing is of much required to meet gas pipeline standards and assure the safety of final users.
G8	Consumed on-site to meet energy demands without being registered as a CDM project activity	**Not Plausible.** In the absence of the proposed project activity, little energy is demanded on-site. Only a very small amount of the recovered gas could be consumed. Therefore, this option is not feasible.
G9	Recovery, transportation and utilization of the associated gas and/or gas-lift gas as feedstock for manufacturing of useful products	**Not Plausible.** A factory which utilizes gas as feedstock for manufacturing of a useful product 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.

Alternatives baseline scenarios for oil and gas infrastructure are analyzed as below in Table B.3:

Table B.3. Summary for baseline scenarios for the oil and gas infrastructure:

NO.	*Scenario description*	*Relevance to the proposed project activity*
P1	Construction of a processing plant for the purpose of processing the recovered gas, in the same way as in the project activity, without being registered as a CDM project activity;	**Not Plausible.** Gas processing plant already exists on site
P2	Construction of a processing plant of a lower capacity than under the project activity, which processes only non-associated gas and no recovered gas;	**Not Plausible.** Gas processing plant already exists on site
P3	Supplying recovered gas to an existing gas processing plant and constructing the necessary infrastructure, without being registered as a CDM project activity;	**Plausible.** The supplying recovered gas to an existing gas processing plant and constructing the necessary infrastructure would lead to the baseline scenario. Thus, Option P3 is considered an alternative.
P4	Continuation of the operation of the existing oil and gas infrastructure without processing of any recovered associated gas and/or gas-lift gas and without any other significant changes;	**Plausible.** The continuation of the operation of the existing oil and gas infrastructure without processing of any recovered associated gas would lead to the baseline scenario. Thus, Option P4 is considered an alternative.
P5	Supplying recovered gas to a gas pipeline without prior processing and without being registered as a CDM project activity.	**Not Plausible.** As stated above this option is not plausible as the gas must be processed to meet quality requirements of the gas pipeline.

Plausible alternative baseline scenarios for the use of gas-lift could include, inter alia:

- O1: 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;
- O2: Gas from a different source than under the project activity but using the same quantity of gas-lift gas as under the project activity, is used for the gas-lift system;
- O3: Gas from the same source as under the project activity but using a different quantity of gas-lift gas, is used for the gas-lift system;

- O4: Gas from a different source than under the project activity and in a different quantity than under the project activity, is used for the gas-lift system;
- O5: No gas-lift system is utilized.

The proposed project might involve gas-lift system; however, neither the gas source nor quantity will be changed. The project developer has also no plan or design to change the gas-lift system. Hence, only **alternative O1** is plausible.

The above analysis results in realistic combination of baseline alternative scenario as:
Option 1: G2+P4+O1, flaring of the associated gas and/or gas-lift gas at the oil production site; continuation of the operation of the existing oil and gas infrastructure without processing of any recovered associated gas and/or gas-lift gas and without any other significant changes; and part of the 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.

Option 2: G6+P3+O1, recovery, transportation, processing of the associated gas and/or gas-lift gas and distribution of products thereof to end-users without being registered as a CDM project activity; supplying recovered gas to an existing gas processing plant and constructing the necessary infrastructure, without been registered as CDM project activity; and part of the 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.

Step 2: Evaluate legal aspects:
All the realistic and credible alternative scenarios (G2, G6, P3, P4, O1) 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.

Step 3 and Step 4 will be carried out in the Section B.5.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

Step 3: Evaluate the economic attractiveness of alternatives

According to AM0009 (version 04), the economic attractiveness is assessed for those alternative scenarios that are feasible in technical terms and that are identified as permitted by law or other (industrial) agreements and standards in Step 2. The economic attractiveness is assessed by determining an expected Internal Rate of Return (IRR) of each alternative scenario.

In the proposed project activity, the alternative scenarios left after ***step 2*** are: G2/G6, P3/P4 and O1.

For G2, **Flaring of the associated gas at the oil production site,** i.e. continuation of the current gas management. This option does not require any additional investment and management, nor are revenues gained. Flaring has been common practice at Block 9 since beginning of oil exploitation.

For G6, **Recovery, transportation, processing of the associated gas and/or gas-lift gas and distribution of products thereof to end-users without being registered as a CDM project activity,** it involves investment and revenues from the sale of products. The following investment analysis is conducted for this alternative. The IRR of above mentioned scenario is determined following the guidance for the investment analysis in the latest approved version of the "Tool for the demonstration and assessment of additionality".

As required by methodology, the IRR should be determined using, inter alia, the following parameters as applicable to the relevant scenario:

- Overall projected production of associated gas and/or gas-lift gas;
- The projected quantity of gas recovered, gas flared, vented, consumed on-site, processed in a gas processing plant and/or compressed into a pipeline;
- The agreed price for the delivery of recovered gas (e.g. from a Production Sharing Contract) to the gas pipeline or gas processing plant (if operated by a third party);
- The net calorific value of the recovered gas;
- Capital expenditure for all oil and gas infrastructure needed in the relevant scenario, such as gas recovery facilities, pipelines, and gas processing plant (if applicable) etc. (CAPEX);
- All operational expenditure associated with the respective scenario (OPEX);
- All revenues from the operation of the alternative scenario, such as revenues from selling processed gas or other products of the gas processing plant or electricity;
- Any profit sharing agreements and cost recovery, such as cost savings through the substitution of products by the recovered gas, if applicable.

Table B.4. Basic data for IRR calculation

Parameter	Data	Unit
Capital expenditures (CAPEX)	86,066,460	US$
Annual Operational expenditures (OPEX)	1,000,000	US$
Total expected quantity of gas recovered over project lifetime	114,172.93	mmscf
Agreed price for the delivery of recovered gas (incremental +1.5% per year)	981	US$/mmscf
Net calorific value of the recovered gas	0.00005279	TJ/m3
Expected price for liquid gains	55	US$/Brl
Expected gross annual average revenues for the Operator as per cost recovery and production sharing agreements	4,048,963	US$
Income tax rate for Operator	55%	-

Since Oman doesn't have a national benchmark, we applied the suggested hurdle rate of 10% in AM0009 as the benchmark. The investment analysis compares the Internal Rate of Return after tax (IRR) of the project with the 10% benchmark. The main results of the investment analysis are presented in Table B.5,

Table B.5. Comparison of the financial indicator for the proposed project activity and the financial benchmark

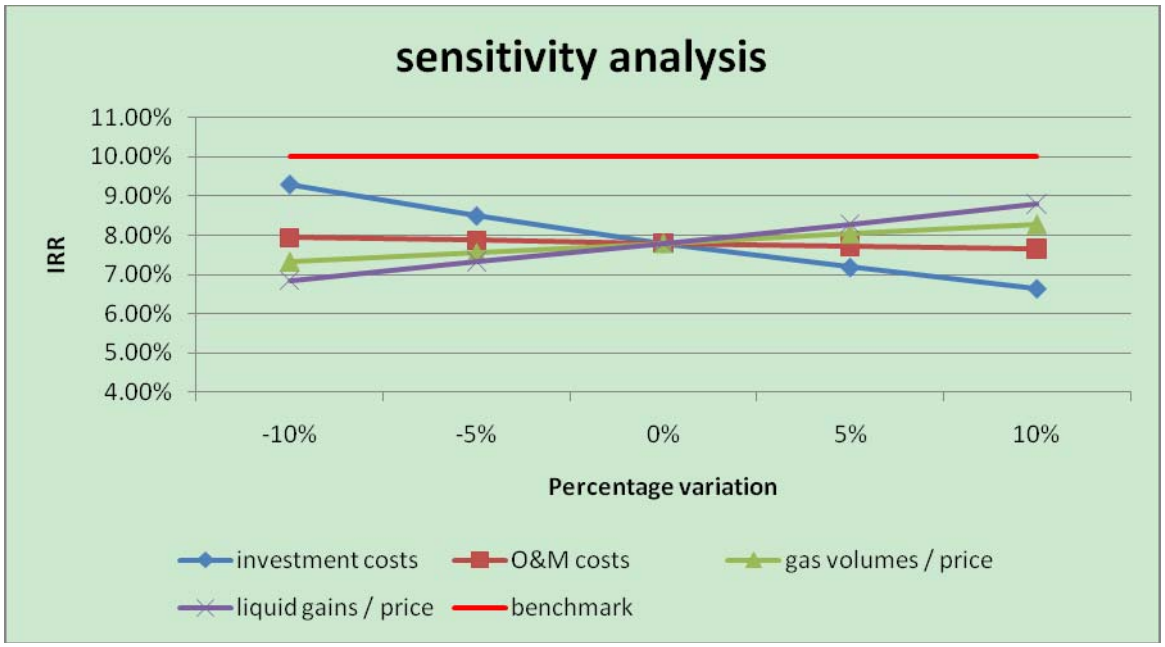
Project IRR	7.80%
Financial benchmark	10%

It is concluded that the CDM project activity has a less favourable indicator than the benchmark, therefore the CDM project activity cannot be considered as financially attractive.

Table B.6. Sensitivity analysis; impact of variations in assumptions on the IRR

Percentage Variation / Critical assumption	-10%	-5%	0%	+5%	+10%
Investment costs	9.30%	8.50%	7.80%	7.19%	6.65%
O&M costs	7.94%	7.87%	7.80%	7.73%	7.66%
gas volumes / price	7.33%	7.56%	7.80%	8.04%	8.28%
liquid gains / price	6.85%	7.32%	7.80%	8.29%	8.79%

Figure B.1. Results of the sensitivity analysis



The sensitivity analysis of the Internal Rate of Return confirms that the proposed project after realistic modifications to the critical assumptions remains commercially non viable without CDM revenues. The Internal Rate of Return of the proposed project activity without CDM revenues remains below the 10% benchmark.

The conclusion is clear that with reasonable modifications in the critical assumptions, the main results remain unaltered. The results of the sensitivity analysis therefore confirm that the ***Option 2***: G6+P3+O1 is not economically attractive for the Operator without CDM support.

Step 4 Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity

In the common practice analysis, we have considered all other associated gas flaring projects that have been implemented in Oman. According to the latest version of "*Tool for the demonstration and assessment of additionality*", projects are considered similar if they are in the same country / region and / or rely on a broadly similar technology, are of similar scale, and

take place in comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc.

Sub-step 4b: Discuss any similar options that are occurring

In Oman, flaring associated gas is common practice throughout the country due to large-scale oil exploration activities, as it can be observed from the *Global Gas Flaring Identification in Google Earth*[2]. Since flare reduction programmes do not require specific Government approval and due to strategic aspects of any oil-related activities, only limited information is publicly available. However, according to data gathered by the *Global Gas Flaring Reduction Partnership of the World Bank*, Oman flared a total of 2.0 Billion Cubic Meters (BCM) associated gas annually in 2007 and 2008 (time of the investment decision) and was hence ranked as No.16 among the gas flaring countries[3]. A comparison of associated gas flared yearly prepared by the *Global Gas Flaring Reduction Partnership of the World Bank* is listed in **Error! Reference source not found.**:

Table B.7 Estimated flared volume from satellite data

Rank	Volume in BCM	2007	2008	2009	2010
16	Oman	2.0	2.0	1.9	1.8

To carry out the common practice analysis, we referred to the most recent data of 4 years from 2007 to 2010 including the time of investment decision. It can be seen from Table B.7, the change of associated gas flaring in Oman prior to 2008 (*the time of investment decision*) is insignificant (2.0 - 2.0 = 0), which shows there is no significant associated gas recovery project activity in Oman between the year 2007 to 2008 when the investment decision was made.

We also supplement the above conclusion with the latest available year of data in 2010, in which year the change of associated gas flaring in Oman is 0.1 billion m^3. The expected/pre-calculated amount of associated gas recovery of the proposed project is 0.2 billion m^3 in 2010, which almost covered the whole change range of flare recovery in Oman that year. Hence above consistent data shows there is no significant associated gas recovery in Oman other than the proposed project activity according to the most recent data. Thus, the project is not a common practice in Oman.

Serious CDM consideration

An overview of key events is given in Table B.7.

Table B.7. Timeline of CDM consideration

Date	Key events	Evidence
Feb. 12th 2008	**Early CDM consideration –** Decision to develop the project under the Clean Development Mechanism	Official correspondence
Apr. 1st 2008	**Start of the project activity** – A Project Authorization Request is approved internally for the reduction of the FW flare and the purchase of a series of new pipeline and re-routes.	Project Authorization Request

[2] http://www.ngdc.noaa.gov/dmsp/interest/gas_flares_countries_kmz.html

May 2008	The Oman Authority for Electricity Regulation recommends that Oman establish a Designated National Authority (DNA) to facilitate and administer incentives for Clean Development Mechanisms (CDM).	Study on Renewable Energy Resources, Oman, Final Report[4]
4th Aug. 2008	The Ministry of Oil & Gas contacts the Ministry of Environment & Climate Affairs (MECA) to inform about the progress of the project and inquire about establishment of the Designated National Authority	Letter
24th May 2009	A Memorandum of Understanding is drafted between Operator on-site and CER buyer	MoU
6th July 2009	MECA issue a statement in the press confirming that DNA is at final stage of establishment	Oman Daily Observer Newspaper
30th Sep 2009	Following MECA statement clarifying the status of Omani DNA establishment process, CDM consultant is hired and starts work	Email correspondence
15th Dec 2009	Meeting is organized between project participants and CDM consultant at Occidental of Oman	Email correspondence
May 10th 2010	Signature of a term sheet for the purchase of carbon credits	Term sheet
Jun. 2010	A CDM-related stakeholder consultation is organized	Questionnaire survey
Sep. 2010	Omani Government names the Directorate General of Climate Affairs (Ministry of Environment and Climate Affairs) as the statutory body with responsibility to serve as the DNA in Oman.	Ministerial Decree 30/2010
Nov. 2010	ERPA is signed with CER buyer	ERPA

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

In accordance with AM0009, baseline is calculated as below,

Baseline emissions
Project activities under this methodology reduce emissions by recovering and utilizing the recovered gas. The utilization of the recovered gas displaces the use of other fossil fuel sources.

Baseline emissions are calculated as follows:

$$BE_y = V_{F,y} \cdot NCV_{RG,F,y} \cdot EF_{CO2,Methane} \quad (1)$$

Where:

BE_y = Baseline emissions during the period y, (tCO_2e)

$V_{F,y}$ = Volume of total recovered gas measured at point F in Figure 2, after pre-processing and before the part of the recovered gas may be used on-site, during the period y, (Nm^3)

[4] http://www.aer-oman.org/pdf/studyreport.pdf

$NCV_{RG,F,y}$ = Net calorific value of recovered gas measured at point F in Figure 2 during the period y, (TJ/Nm^3)

$EF_{CO2, Methane}$ = CO_2 emission factor for methane (tCO_2/TJ)

Project emissions

The following sources[5] of project emissions are accounted in this methodology:
- CO2 emissions due to consumption of fossil fuels for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas;
- CO2 emissions due to the use of electricity for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas.

Project emissions are calculated as follows:

$$PE_y = PE_{CO2,fossilfuels,y} + PE_{CO2,elec,y} \quad (2)$$

Where:

PE_y = Project emissions in the period y, (tCO_2e)

$PE_{CO2,fossilfuels,y}$ = CO2 emissions due to consumption of fossil fuels for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to the points A and C in Figure 2 during the period y, (tCO_2e)

$PE_{CO2,elec,y}$ = CO2 emissions due to the use of electricity for recovery, pre-treatment, transportation and, if applicable, compression of the recovered gas up to the points A and C in Figure 2 during the period y, (tCO_2e)

(i) $PE_{CO2,fossilfuels,y}$ *Project emissions from the consumption of fossil fuels*:

Project emissions $PE_{CO2, fossilfuels, y}$ due to the consumption of fossil fuels, including the recovered gas, if applicable for the recovery, pre-treatment, transportation and, if applicable, compression of the recovered gas are calculated applying the latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" where process j corresponds to a source of fuel combustion (e.g. a compressor, etc). All applicable emission sources should be documented transparently in the CDM-PDD and in monitoring reports.

This parameter has been accounted in PDD since part of the recovered associated gas is used as fuel within the CDM project boundary.

(ii) $PE_{CO2,elec,y}$ *Project emissions from consumption of electricity:*

Project emissions $PE_{CO2, elec, y}$ due to the use of electricity for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas are calculated applying the latest approved version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". All applicable sources of electricity consumption should be documented transparently in the CDM-PDD and in monitoring reports.

[5] Other sources of project emissions such as emissions from leaks, venting and flaring during the recovery, transportation and processing of recovered gas are assumed to be of similar magnitude in the baseline scenario.

As onsite electricity generator will consume the project recovered gas for generation, which has already been counted as project emission Project emissions from the consumption of fossil fuels, to avoid doubt counting, this part will not be included in.

There will be no other electricity consumed within the project boundary other than the amount mentioned above,

Thus, $PE_{CO2, elec, y} = 0$.

Leakage

No leakage emission is considered as mentioned in AM0009.

Thus, $LE_y = 0$.

Emission reductions

Emission reductions are calculated as follows:

$$ERy = BEy - PEy \quad (3)$$

Where:

ERy = Emission reductions in the period *y*, (t CO2e)

BEy = Baseline emissions in the period *y*, (t CO2e)

PEy = Project emissions in the period *y*, (t CO2e)

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	$EF_{CO2,Methane}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor for methane
Source of data used:	The Energy Information Administration (EIA), Department of Energy, USA <http://www.eia.doe.gov/oiaf/1605/coefficients.html> presents the default emission factor of 115.258 pounds of CO_2 per million BTU.
Value applied:	49.55 tCO_2/TJ
Justification of the choice of data or description of measurement methods and procedures actually applied :	---
Any comment:	---

B.6.3. Ex-ante calculation of emission reductions:

The following section gives details about the ex-ante estimation of emission reduction based on the equations laid out in section B.6.1 above and the ex-ante values available at the time of CDM project developing.

Baseline emissions

$EF_{CO2, Methane}$ uses the default value 49.55 tCO2/TJ according to methodology AM0009 (version 04). Applying formula (1) presented in Section B.6.1, we obtain the values for the baseline emissions during crediting period provided in **Error! Reference source not found.**

Table B.8. Ex-ante estimation of baseline emissions during crediting period

	$V_{F,y}$	$NCV_{RG,F,y}$	$EF_{CO2,Methane}$	BE_y
year	**Volume of total recovered gas (Nm^3)**	**Net calorific value of recovered gas (TJ/Nm3)**	**CO2 emission factor for methane (tCO2/TJ)**	**Estimation of baseline emissions (tCO2e)**
01/01/2012 – 31/12/2012	655,979,996	0.00005279	49.55	1,715,996
01/01/2013 – 31/12/2013	594,848,161	0.00005279	49.55	1,556,080
01/01/2014 – 31/12/2014	475,702,223	0.00005279	49.55	1,244,402
01/01/2015 – 31/12/2015	346,883,939	0.00005279	49.55	907,423
01/01/2016 – 31/12/2016	295,751,461	0.00005279	49.55	773,664
01/01/2017 – 31/12/2017	222,591,695	0.00005279	49.55	582,284
01/01/2018 – 31/12/2018	178,513,754	0.00005279	49.55	466,979
01/01/2019 – 31/12/2019	156,711,730	0.00005279	49.55	409,946
01/01/2020 – 31/12/2020	0	0	0	0
01/01/2020 – 31/12/2021	0	0	0	0
total	**2,926,982,959**			**7,656,774**

Project emissions

The following sources1 of project emissions are accounted in this methodology:
• CO2 emissions due to consumption of fossil fuels for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas;
• CO2 emissions due to the use of electricity for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas.

As been specified in part B.6.1, $PE_{CO2, elec, y} = 0$.

PE_y has been calculated based on $PE_{CO2, fossilfuels, y}$ as in the following table:

Table B.9. The estimation of project emissions during crediting period

	$PE_{CO2,elec,y}$	$PE_{CO2,fossilfuels,y}$	PE_y
year	**CO2 emissions du to the use of electricity (tCO2e)**	**CO2 emissions due to consumption of fossil fuels (tCO2e)**	**Project emissions in the period y, (tCO2e)**
01/01/2012 – 31/12/2012	-	51,852	51,852

01/01/2013 – 31/12/2013	-	51,852	51,852
01/01/2014 – 31/12/2014	-	51,852	51,852
01/01/2015 – 31/12/2015	-	51,852	51,852
01/01/2016 – 31/12/2016	-	51,852	51,852
01/01/2017 – 31/12/2017	-	51,852	51,852
01/01/2018 – 31/12/2018	-	51,852	51,852
01/01/2019 – 31/12/2019	-	51,852	51,852
01/01/2020 – 31/12/2020	-	0	0
01/01/2021 – 31/12/2021	-	0	0
Total			**414,818**

Leakage
There is no leakage emission considered, thus $LE_y = 0$.

B.6.4 Summary of the ex-ante estimation of emission reductions:

Table B.10 provides the annual emission reductions in tabular form.

Table B.10. Estimate of emission reductions due to the project in crediting period

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
01/01/2012 – 31/12/2012	51,852	1,715,996	0	1,664,144
01/01/2013 – 31/12/2013	51,852	1,556,080	0	1,504,227
01/01/2014 – 31/12/2014	51,852	1,244,402	0	1,192,550
01/01/2015 – 31/12/2015	51,852	907,423	0	855,571
01/01/2016 – 31/12/2016	51,852	773,664	0	721,812
01/01/2017 – 31/12/2017	51,852	582,284	0	530,431
01/01/2018 – 31/12/2018	51,852	466,979	0	415,127
01/01/2019 – 31/12/2019	51,852	409,946	0	358,094
01/01/2020 – 31/12/2020	0	0	0	0
01/01/2021 – 31/12/2021	0	0	0	0
Total (tons of CO_2e)				**7,241,956**
Average (tons of CO2e)				804,662

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	$V_{F,y}$
Data unit:	Nm^3
Description:	Volume of the total recovered gas measured after pretreatment and before the part of the recovered gas is used on-site, during the period *y*.

Source of data to be used:	Flow meter or on-line instruments installed by PO
Value of data applied for the purpose of calculating expected emission reductions in section B.6	See Annex 3 for details
Description of measurement methods and procedures to be applied:	Data will be measured continuously using calibrated flow meters. Measurements will be taken at the point(s) where recovered gas exits the pretreatment plant.
QA/QC procedures to be applied:	Volume of gas should be completely metered with regular calibration of metering equipment. The measured volume should be converted to the volume at normal temperature and pressure using the temperature and pressure at the time to measurement.
Any comment:	-

Data / Parameter:	$NCV_{RG,F,y}$
Data unit:	TJ/Nm3
Description:	Net calorific value of recovered gas measured at the point of $V_{F,y}$ has been recorded during the period *y*
Source of data to be used:	On site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.6	0.00005279
Description of measurement methods and procedures to be applied:	Measurements should be undertaken in line with national or international fuel standards. At least monthly
QA/QC procedures to be applied:	The laboratories performing NCV measurements should have ISO17025 accreditation or justify that they can comply with similar quality standards
Any comment:	-

B.7.2. Description of the monitoring plan:

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emissions reductions during the whole crediting period. The project owner will be responsible for the implementation of the monitoring plan. Monitoring procedures may be adjusted from time to time but will not deviate from the principles described in the monitoring plan below.

Operational procedures:

$V_{F,y}$ Volume of the total recovered gas measured after pretreatment and before the part of the recovered gas is used on-site, during the period y

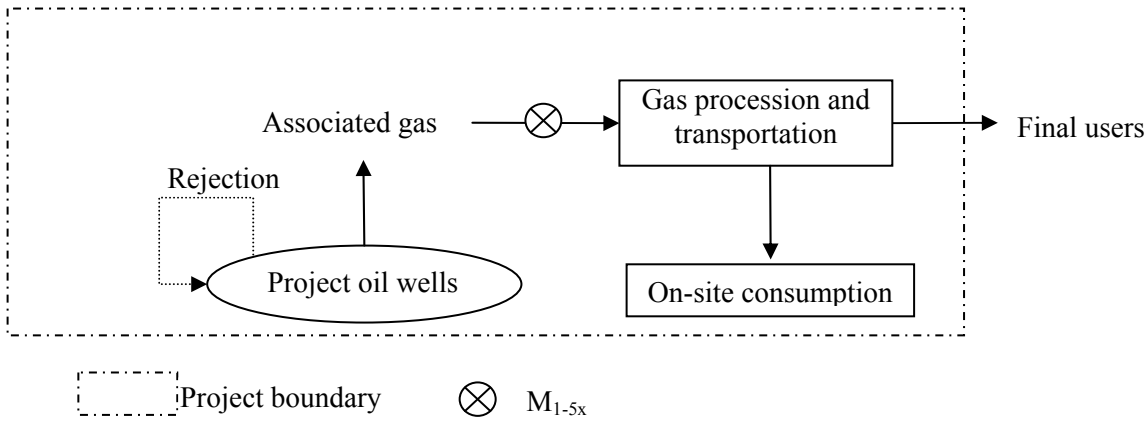
The parameter that needs to be actively monitored is volume of the total recovered gas measured after pretreatment and before the part of the recovered gas is used on-site, during the period y. There will be meter(s) at the each location within block 9. Details as follow:

Table B.8 Details of metering instruments

Meter	Operated by	Location	Electronic measurement	Recording	Calibration	Documentation
M1x	Project entity	SGP	Continuously	Monthly	Periodical calibration	Plant log books
$M2_X$	Project entity	FW	Continuously	Monthly	Periodical calibration	Plant log books
M3x	Project entity	WL	Continuously	Monthly	Periodical calibration	Plant log books
M4x	Project entity	JAL	Continuously	Monthly	Periodical calibration	Plant log books
M5x	Project entity	SAT	Continuously	Monthly	Periodical calibration	Plant log books

The following Figure B.3 shows the location of monitoring points within project boundary.

Figure B.3. Indicative monitoring diagram



Data management:

All electronic and hard copy records of the metering devices, relevant documentation and the results of calibration will be collected in a central place by the project entity. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.

Emergencies:

In case of emergencies[6], the project entity will not claim emission reductions due to the project activity for the duration of the emergency. The project entity will follow the following procedure for declaring the emergency period to be over:

1. The project entity will ensure that all requirements for monitoring of emission reductions have been re-established.

[6] Emergencies are defined as conditions under which the PO has not been able to monitor due to an unexpected incident.

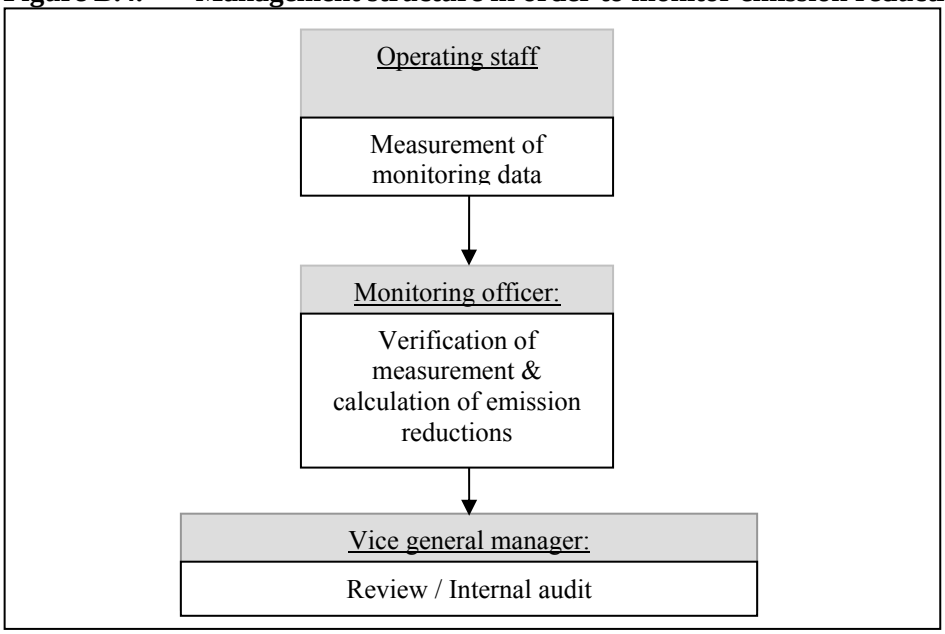
2. The monitoring officer and the head of operations of the cement production facility will both sign a statement declaring the emergency situation to have ended and normal operations to have resumed.

OPERATIONAL AND MANAGEMENT STRUCTURE FOR MONITORING

The monitoring of the emission reductions will be carried out according to the scheme shown in Figure B.4. The overall responsibility for the monitoring process will be held by the Vice General Manager of the project entity. Some of the monitoring tasks will be delegated as indicated in Figure B.4. The first step is the measurement of the associated gas recovered by the project, the measurement of the NCV of associated gas and reporting of daily operations, which will be carried out by the plant manager.

The project entity will appoint a monitoring officer who will be responsible for verification of the measurement, and the calculation of the emissions reductions. The monitoring officer will prepare operational reports of the project activity, recording the daily operation of the project. The selection procedure, tasks and responsibilities of the monitoring officer are described in detail in Annex 4. Finally, the monitoring reports will be reviewed by the Vice General Manager, who will carry the final responsibility for the monitoring report.

Figure B.4. Management structure in order to monitor emission reductions



B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

Date of completion of the baseline study and monitoring methodology: 15/06/2011

Name of person determining the baseline study and the monitoring methodology:
Caspervandertak Consulting
Tel: +86-10-84505756

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Email: christophe@cdmasia.org, yinli@cdmasia.org, dengping@cdmasia.org

Caspervandertak Consulting is not project participant.

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

01/03/2008 (March. 1th 2008)

This was the date when the earliest project contract has been signed.

C.1.2. Expected operational lifetime of the project activity:

11 years 0 month

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

Not applicable

C.2.1.2. Length of the first crediting period:

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/01/2012 (or the date of registration, which is later)

C.2.2.2. Length:

10 years 0 months

SECTION D. Environmental impacts

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

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 has already been considered in early stage. Still, the following has been identified as key possible environmental impacts:

1. Air quality:
Due to the general low industrial emission sources and relatively low population density, air quality in Oman is good. And the air pollution will be significantly reduced due to the project activity as a result of associated gas recovery.

2. Noise
The noise during the operation period is mainly from compressors. However, the project is located in remote area, where few resident lives around. Therefore, noise from the project activity is not significant harm to the environment.

3. Solid waste
The Block 9 field itself already has a treatment system for solid waste, which can be applied to as well to the proposed project; the impact of solid waste on the environment is limited.

In light of the above analysis, it is concluded that the proposed project activity has no significant negative impacts on the ambient environment during the construction and operation period. Some impacts are short-term, and others are mitigated through appropriate preventive and mitigation measures. Therefore, this project does not have significant negative environmental impact.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

It is considered that the proposed project will have no significant environmental impacts after implementing the environmental protection measures and requirements.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

In order to confirm the impact of the project on local stakeholders, the project entity carried out a separate stakeholder consultation on recognized stakeholders near the project site on **July 2nd and 4th 2010.** We will describe in this section how comments have been invited and compiled while the results of the consultations are provided in section E.2.

As the project aims to recover associated gas which would be flared in the absence of the project activity, as the project location is a deserted sand dune area to the sand and gravel plains it will have minor impact on local environment and thus minor impact on local residents.

Stakeholders were selected among workers on/near site.

Stakeholders were informed and consulted about the project by means of a questionnaire survey which included the following elements:
- An introduction of the project
- An introduction of the Clean Development Mechanism
- An explanation of the purpose of the stakeholder consultation process
- A set of questions to assess the impacts of the project

A total number of 20 questionnaires have been filled in and outcomes of the survey are provided in section E.2.

E.2. Summary of the comments received:

The results of the questionnaire surveys among project participants are presented in Table E.1. The results of the questionnaire surveys show that all respondents fully support the project without any negative opinion towards the project.

Table E.1. Summary of questionnaire results

NO.	Impacts of the project			Results	Number of total interviewees	Percentage
1	Environment	Construction of associated gas utilization project	Benefit local environment	20	20	100%
			No benefit	0		0%
			Not sure	0		0%
		Current practice of gas flaring	Benefit local environment	0	20	0%
		Global warming	No benefit	20	20	100%
			Not sure	0		0%
			Reduce	20		100%
		Any negative impact	No effect	0	20	0%
			Not sure	0		0%
			Yes	0		0%
			No	20		100%
2	Local economy		Benefit local economy	20	20	100%
			No benefit	0		0%
			Not sure	0		0%
3	General opinion	Regarding the project construction	Fully support	20	20	100%
			Not support	0		0%
			Not sure	0		0%

Conclusion for questionnaire survey:
The results show that the 100% of the stakeholders support the gas recovery project for its contribution to environment. All of the participants agreed that the project will bring no negative impact on economy, environment or society.

After all, the project is an energy efficiency project on existing facilities. The project plant was located in desert area thus will have limited impact on local residents during construction and operation period. Local stakeholders consider that the project will be bring benefit and support the project implementation.

E.3. Report on how due account was taken of any comments received:

Given the generally positive nature of the comments received, no further action is considered necessary.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from Annex I Party is involved in this project.

Annex 3

BASELINE INFORMATION

The calculation for emission reductions following AM0009 has been listed as follow:

Baseline emissions:

Table.1 Summary of the ex-ante baseline emission

Parameters	2011	2012	2013	2014	2015	2016	2017	2018	2019
$V_{F,y}$	620,671,139	655,979,996	594,848,161	475,702,223	346,883,939	295,751,461	222,591,695	178,513,754	156,711,730
$NCV_{RG,F,y}$	0.00005279	0.00005279	0.00005279	0.00005279	0.00005279	0.00005279	0.00005279	0.00005279	0.00005279
EFCO2,Methane	49.55	49.55	49.55	49.55	49.55	49.55	49.55	49.55	49.55
BE_y	**1,623,631**	**1,715,996**	**1,556,080**	**1,244,402**	**907,423**	**773,664**	**582,284**	**466,979**	**409,946**

Table 1.1 Basic information:

Parameters	Value	Units	Source
Average net calorific value of recovered gas ($NCV_{RG,F,y}$)	0.00005279	TJ/m^3	Calculated
CO_2 emission factor for methane ($EF_{CO2,Methane}$)	49.55	tCO_2/TJ	Defined in AM0009

Table 1.2 Associated gas recovery estimation (Unit: mmscfd)

	2011	2012	2013	2014	2015	2016	2017	2018	2019
SGP	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
FW	13.58	16.65	14.68	9.85	3.96	3.04	1.18	0.00	0.00
WL	24.35	28.35	28.17	23.13	18.06	15.71	11.28	8.01	5.81
JAL	5.34	6.99	7.17	5.02	2.98	1.10	0.00	0.00	0.00
SAT	9.36	4.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**62.63**	**66.19**	**60.02**	**48.00**	**35.00**	**29.84**	**22.46**	**18.01**	**15.81**

Table 1.3 Yearly recovered associated gas (Unit: mmscf**)**

	2011	2012	2013	2014	2015	2016	2017	2018	2019
SGP	3,500.00	3,500.00	3,500.00	3,500.00	3,500.00	3,500.00	3,500.00	3,500.00	3,500.00
FW	4,753.86	5,826.51	5,137.74	3,448.60	1,386.21	1,063.86	413.49	0.00	0.00
WL	8,520.95	9,923.03	9,860.30	8,095.20	6,320.99	5,496.84	3,947.28	2,804.16	2,034.23
JAL	1,868.80	2,448.15	2,508.86	1,755.50	1,042.91	383.68	0.00	0.00	0.00
SAT	3275.22	1468.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**21,919**	**23,166**	**21,007**	**16,799**	**12,250**	**10,444**	**7,861**	**6,304**	**5,534**

Table 1.4 Parameters for calculation

Conversion units		
1 Ft^3 =	0.02832	m^3
1 kJ =	0.9478	BTU
1 TJ =	1,000,000,000	kJ
Annual operational days	350	operational days

Table 1.5 Gross heating value measured by PO

	Gross Heating Value (Btu/cu. ft.)	Mole Fraction	Gross Heating Value (Btu/cu. Ft)
Methane	1,010	0.64	648
Ethane	1,770	0.11	189
Propane	2,516	0.10	246
i-butane	3,252	0.03	93
n-butane	3,262	0.04	121
i-Pentane	4,001	0.01	44
n-Pentane	4,009	0.01	40
n-Hexane	4,756	0.01	36
			1,417

Project emissions:

Table 2 Summary of the ex-ante project emission (Unit: tCO2e)

Parameters	2011	2012	2013	2014	2015	2016	2017	2018	2019
$PE_{CO2,elec,y}$	-	-	-	-	-	-	-	-	-
$PE_{CO2,fossilfuels,y}$	51,852	51,852	51,852	51,852	51,852	51,852	51,852	51,852	51,852
PE_y	**51,852**	**51,852**	**51,852**	**51,852**	**51,852**	**51,852**	**51,852**	**51,852**	**51,852**

Table 3.1 **Ratio of fuel consumption** Unit: mmscfd

Parameters	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fuel consumption at SGP	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Fuel consumption at FW	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Fuel consumption at WL	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Fuel consumption at JAL	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Fuel consumption at SAT	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25

Table 3.2: **Yealy fuel consumption** Unit: mmscf

Parameters	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fuel consumption at SGP	87.50	87.50	87.50	87.50	87.50	87.50	87.50	87.50	87.50
Fuel consumption at FW	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00	175.00
Fuel consumption at WL	262.50	262.50	262.50	262.50	262.50	262.50	262.50	262.50	262.50
Fuel consumption at JAL	87.50	87.50	87.50	87.50	87.50	87.50	87.50	87.50	87.50
Fuel consumption at SAT	87.50	87.50	87.50	87.50	87.50	87.50	87.50	87.50	87.50
Total fossil fuel consumption	**700.00**	**700.00**	**700.00**	**700.00**	**700.00**	**700.00**	**700.00**	**700.00**	**700.00**
Total electricity consumption	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Operational days	350	days							

Emission Reduction:

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
01/01/2012 – 31/12/2012	51,852	1,715,996	0	1,664,144
01/01/2013 – 31/12/2013	51,852	1,556,080	0	1,504,227
01/01/2014 – 31/12/2014	51,852	1,244,402	0	1,192,550
01/01/2015 – 31/12/2015	51,852	907,423	0	855,571
01/01/2016 – 31/12/2016	51,852	773,664	0	721,812
01/01/2017 – 31/12/2017	51,852	582,284	0	530,431
01/01/2018 – 31/12/2018	51,852	466,979	0	415,127
01/01/2019 – 31/12/2019	51,852	409,946	0	358,094
01/01/2020 – 31/12/2020	0	0	0	0
01/01/2021 – 31/12/2021	0	0	0	0
Total (tons of CO_2e)				**7,241,956**
Average (tons of CO2e)				804,662

Annex 4

MONITORING INFORMATION

Selection procedure:
The monitoring officer will be appointed by the general manager of the entity operating the project. The monitoring officer will be selected from among the senior technical or managerial staff.

Tasks and responsibilities:
The monitoring officer will be responsible for carrying out the following tasks:

- **Supervise and verify metering and recording:**
  The monitoring officer will coordinate with the plant manager to ensure and verify adequate metering and recording of data, including power delivered to the grid.
- **Collect additional data, sales / billing receipts:**
  The monitoring officer will collect plant records for amount of recovered associated gas, and additional data such as the operational reports of the project.
- **Calculate emission reductions:**
  The monitoring officer will calculate the annual emission reductions on the basis of measured results. The monitoring officer will be provided with a calculation template in electronic form by the project's CDM advisors.
- **Monitoring report**
  The monitoring officer will annually prepare a monitoring report which will include among others a summary of daily operations, metering values of amount of recovered gas and other requested data.