CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

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Implementing energy efficient measures to reduce fuel gas consumption at GASCO.

Version 01

16/04/2008

A.2. Description of the small-scale project activity:

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GASCO is an operating company under Abu Dhabi National Oil Company (ADNOC). GASCOs primary business is processing of associated gas and produce Natural gas liquids (NGL) or fuel gas[1] in its three industrial facilities located at Asab, Bab and Buhasa. A brief description of each plant is given below:

Asab: The Asab Plant is designed for collection of associated gases from oil-gas separation plants and to process these gases into NGL.

Bab: The Bab Plant is one of GASCO's original plants. The produced NGL is piped further for fractionation.

Bu Hasa: The plant processes associated gas and produces natural gas liquids from the neighbouring Bu Hasa oil-gas field in the central desert.

NGL production is an energy intensive process which is combination of processing, sweetening and liquefaction of sweet gas to NGL. The proposed measure in the project activity aims to increase energy efficiency, minimize fuel gas consumption and thus reduce GHG emissions in the industrial facilities at Asab, Bab and Buhasa. The new measure (velocity seals) shall be implemented on each new burn pits[2] at Asab, Bab and on stack at Buhasa along with complete automation and DCS system to reduce the fuel gas consumption and also improve integrity of the project. Thus, the initiative taken by GASCO is a step to reduce fuel gas and additionally make it available for internal and other productive usage within Abu Dhabi gas network. The step attempts to improve energy efficiency and further promote sustainable growth in Abu Dhabi.

Objective:

[1] Fuel gas composition consists of majorly methane which is similar to natural gas. Please refer for the composition of fuel gas in Annexure 3

The objective of the proposed project is to conserve energy through implementation of efficient technology in the plant, minimize fuel gas and subsequently reduces the Greenhouse Gas (GHG) emissions.

GASCO as a part of ADNOC group continuously strives to conserve precious fossil fuel and makes efforts to reduce environmental foot print and its associated impacts. GASCO has studied different ways to minimize fuel gas flow rates, and has found that this can best be achieved through installation of velocity seals on the burn pits/stacks. As on date, a velocity seal technology is not commonly implemented and remains still un-proven in the UAE region hence involves different uncertainties and risks in implementation and operation. The project activity attempts to take a challenge and also demonstrate CO_2 emissions reduction. Thus CO_2 reduction can result to CDM revenues which can assign a monetary value and provide a partial incentive towards the project activity. Some of sustainability features of the proposed CDM project activity are:

1. The measure helps to reduce flow rates of fuel gas.
2. Conserves natural resources.
3. Reduce environment/carbon foot print.

Contribution to sustainable development:

UNFCCC has defined four indicators under CDM projects to demonstrate sustainable approach on technology, financial, environment and social fronts. Over the last few years the UAE has experienced an increase in industrial activity / accompanied by increase in fuel gas demand and as a consequence, a shortage of fuel gas[3] is being experienced in UAE for energy production due to various factors and conditions. The proposed project after implementation will reduce the fuel gas flow rates which results in additional fuel gas availability that can be utilized in the industrial facility or supplied to gas network for beneficial energy usage. The additional quantities of gas recovered from the activity will help UAE to conserve other fossil fuels and reduce CO_2 emissions.

GASCO is committed to protect environment, and continuously strives to reduce the adverse environmental impacts of its operations. On the environment front the project contributes positively by

[2] New Burn pits will be installed at ASAB and BAB and stacks at BUHASA along with complete new equipment and instrumentation.

[3] See www.adwec.ae/statistics for fuel consumption data for the electricity sector

reducing thermal pollution, SO_X, NO_X and particulates emissions. The project is expected to have a good and positive impact on the employee's health, safety and working environment at Asab, Bab and Buhasa. If the project is successfully implemented, it can contribute to motivate and enable employees to pursue other ideas to reduce the environmental and carbon footprint of GASCO's operations. The proposed clean development mechanism project fits well into the United Arab Emirates' focus on gas utilization and GHG emission reduction.

A.3. 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)
United Arab Emirates (host)	▪ Abu Dhabi Gas Industries Ltd (GASCO) ▪ MASDAR	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

>>
The United Arab Emirates

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

>>
Emirate of Abu Dhabi

A.4.1.3. City/Town/Community etc:

>>
Asab, Bab and Bu Hasa

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

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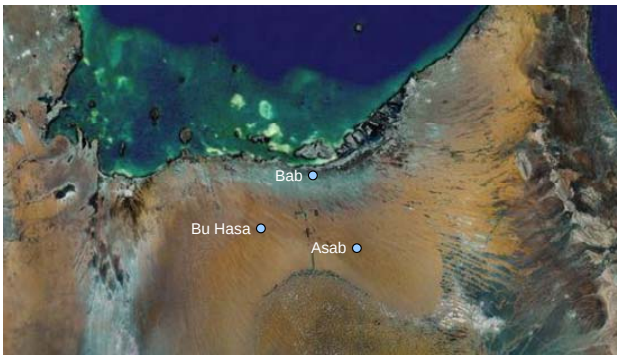
The project activity takes place in the following three physical sites within the United Arab Emirates:

Asab: 23:15:00 North, 54:13:30 East
135 km S of Abu Dhabi

Bab: 23:56:00 North, 53:44:00 East
85 km SW of Abu Dhabi



Bu Hasa: 23:33:00 North, 53:18:30 East
Town 140 km SW of Abu Dhabi

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

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Type and category:

The project meets the applicability criteria of the small-scale CDM project activity category, Type-II: energy efficiency improvement projects (D: Energy efficiency and fuel switching measures for industrial facilities) of the 'Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories'.

Main Category: Type II – Energy efficiency improvement project

Sub Category: "D" - Energy efficiency and fuel switching measures for industrial facilities

Technology:

The technology to be implemented to reduce fuel gas consumption is addition of velocity seals to the burn pits/stack tips. The purpose of technology is to reduce the amount of fuel gas that was continuously sent. These are very important equipment required to ensure the safety of equipments and people working in plant. The other beneficial use it prevents ingress of air and prevents explosive condition in burn pits/stacks and maintains a continuous optimised flow of fuel gas to be maintained in the forward direction. In the absence of any devices this quantity of gas would have been substantial. As of today, there are currently no such devices installed in any of the systems. In the project activity, the device installed will conserve energy by reducing fuel gas flow rates. Figure A.4.2 shows simple schematic of velocity seal technology.

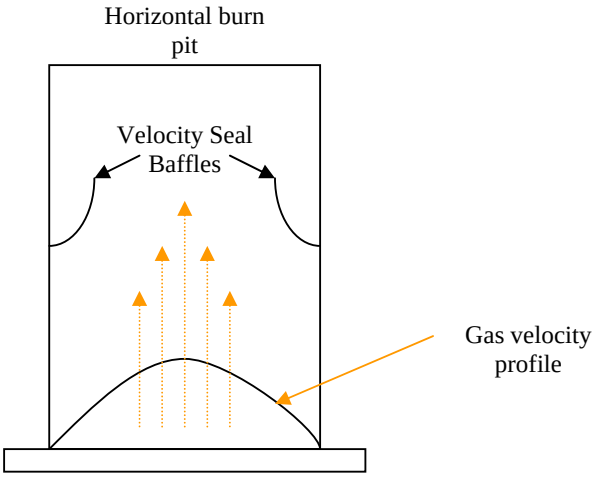

Figure A.4.2: Fuel Gas flow reduction by Velocity Seal technology

A velocity seal is a cone shaped obstruction with single or multiple baffles, which forces the air away from the wall of the pit line where it encounters the focused gas flow and is swept out. This type of seal normally reduces the gas velocity to 0.109 meter per second (mps) or 0.36 feet per second (fps), and serves to reduce the gas flow required for environment benefit and system in. Proposed modifications will include installation of velocity seal in burn pits/stacks, engineering and installation of associated modification to instrumentation for minimizing fuel gas consumption and monitoring.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

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Crediting Period (Years)	**Annual estimation of emission reductions in tonnes of CO_{2e}**
2009	8,565
2010	8,565
2011	8,565
2012	8,565
2013	8,565
2014	8,565
2015	8,565
2016	8,565
2017	8,565
2018	8,565
Total estimated reductions (tonnes of CO_{2e})	**85,650**
Total number of crediting years	**10**
Annual average over crediting period of estimated reductions (tonnes of CO_{2e})	**8,565**

A.4.4. Public funding of the small-scale project activity:

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GASCO – Asab, Bab and Buhasa has not received any international public funding for the project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

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According to appendix C of simplified modalities and procedures for small-scale CDM project activities, '*debundling*' is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities.

According to paragraph 2 of appendix C, a proposed small-scale project activity shall be deemed to be a de-bundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

The project boundary encompasses all three industrial sites of Asab, Bab and Buhasa and there are no other CDM project activities within 1 km boundary of the proposed bundled small-scale activity at the closest point. The proposed project activity is thus not a de-bundled component of a large scale project activity.

On the contrary, this PDD describes a bundle of project activities belonging to the same type, same category and technology/measure taking place in three distinct industrial facilities[4].

[4] The selected methodology (AMS-II.D, Version 11, EB35) is only applicable to energy efficiency measures implemented at single industrial production facilities, but bundling is allowed and justified in a separate document (see form F-CDM-SSC-BUNDLE).

SECTION B. Application of a baseline and monitoring methodology

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

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The proposed CDM project activity is developed under the approved small-scale methodology AMS-II.D. (Version 11) – *"Energy Efficiency and fuel switching measures for industrial facilities"*

B.2 Justification of the choice of the project category:

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Justification of how the proposed CDM project adheres to applicability criteria of the selected project category:

S.No	Applicability Criteria	Justification
1.	Category II.D. comprises any energy efficiency and fuel switching measure implemented at a single industrial facility. The category covers project activities aimed primarily at energy efficiency	*The main objective of the proposed project activity is to improve the overall energy efficiency of by reducing fuel gas flow rates within the project boundary by installing velocity seals at each project site.*
2.	The measures may replace, modify or retrofit existing facilities or be installed in a new facility	*The proposed CDM project activity will completely replace and modify the existing system with the proposed new burn pits with velocity seals and associated equipments and instrumentation at Asab, Bab and Buhasa*
3.	The aggregate energy savings of a single project may not exceed the equivalent of 60 GWh_e per year. A total saving of 60 GWh_e per year is equivalent to a maximal saving of 180 GWh_{th} per year in fuel input.	*The aggregate energy savings from the project activity described in this PDD is 45.61GWh_{th} which is <180 GWh_{th} per year in fuel input. Therefore the criterion is applicable.*

B.3. Description of the project boundary:

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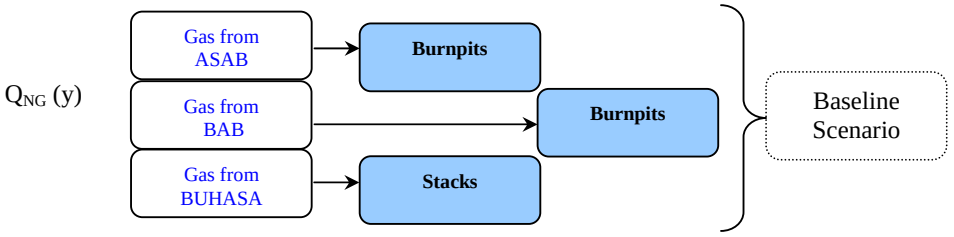
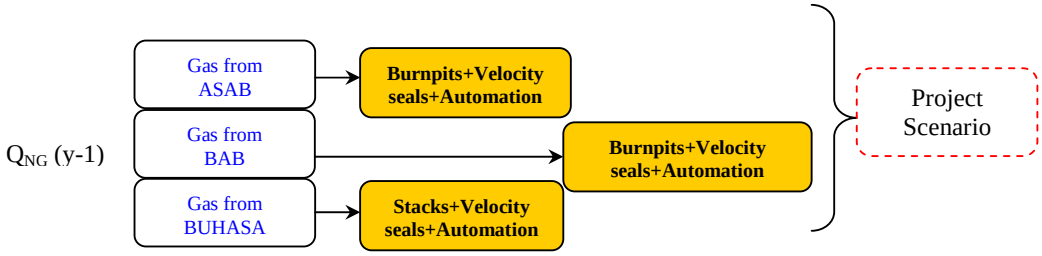
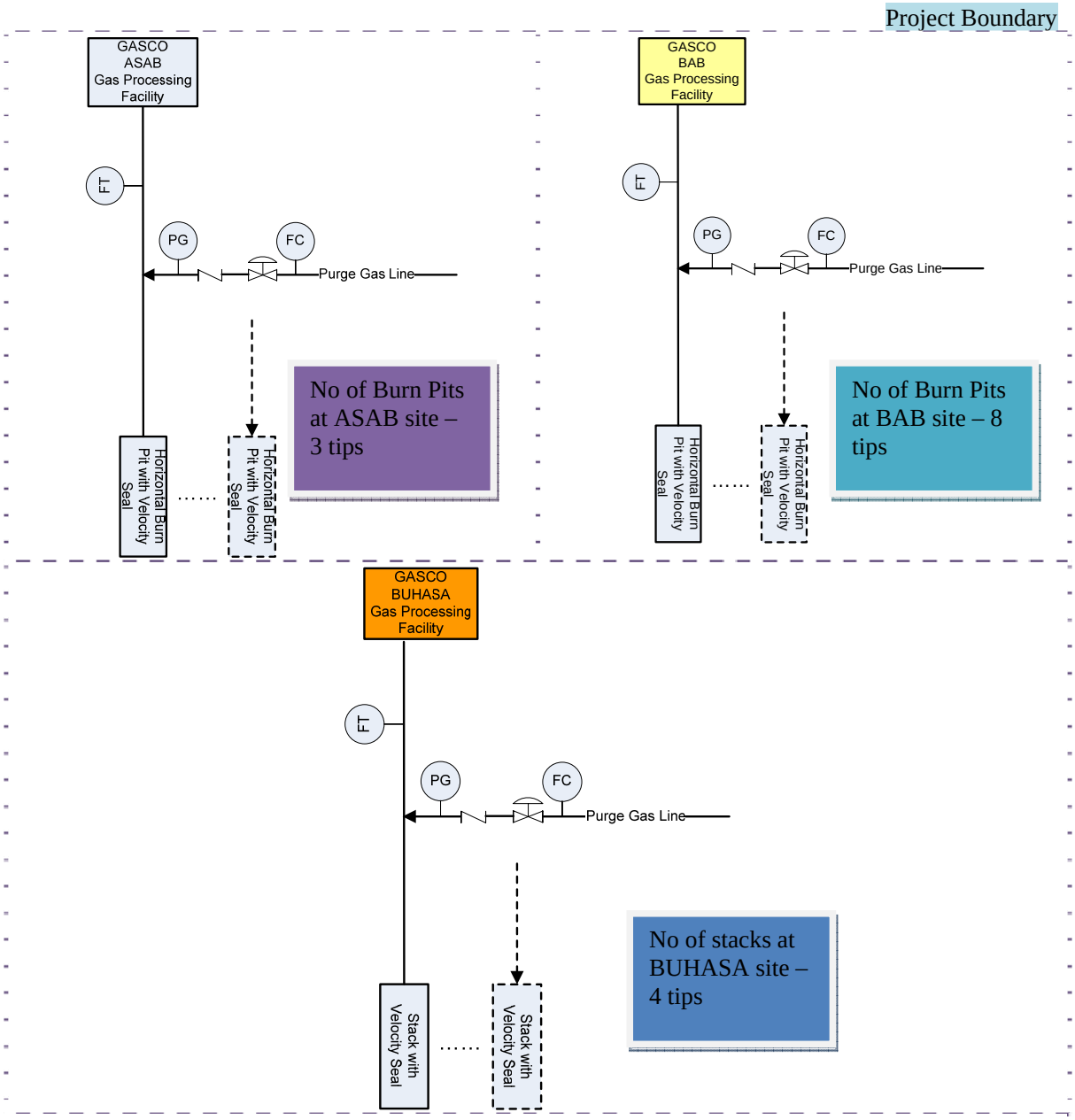
As per approved small scale methodology AMS.II.D guidelines for project boundary, A project boundary is the physical, geographical site of the industrial or mining and mineral production facility, processes or equipment that are affected by the project activity. Velocity seals are installed below of each existing system.

Baseline Scenario



Project Scenario





`Figure B.3: Project boundary and Schematic representation of each system and project boundary at ASAB, BAB and BUHASA

Note:
FC: Flow controller, P: Pressure gauge
Representative schematic for a burn pit/stack which are proposed to be implemented at respective sites.

B.4. Description of baseline and its development:

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According to AMS-II.D version 11. the baseline consists of *"the energy use of the existing equipment that is replaced in the case of retrofit measures."*. The assumption is that in the absence of the CDM project activity, the existing facilities would continue to consume/spend energy at historical design levels until the time at which the facilities would be likely to be replaced, modified or retrofitted in absence of the CDM project activity.

Table 3: Baseline design natural gas flow rates

Location	Baseline Fuel Gas Flow (MMSCM)
ASAB	6.85710
BAB	7.35600
BUHASA	8.68100
Total	**22.89410**

According to paragraph 6 of AMS.II.D version 11, EB35

The project proponent has made modification in the existing system by adding velocity seals which helps in reducing gas quantities. In absence of the project activity the project proponent would have continued sending the same quantities of gas to the burnpits/stacks. To ascertain the baseline emissions we have considered the historical data for three years before the project activity started implementation.

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 small-scale CDM project activity:

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The proposed CDM project reduces anthropogenic emissions of greenhouse gases by sources below those that would have occurred in absence of the project activity. As per the decision 17/cp.7 Para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

Barriers and Additionality:

Referring to attachment A to appendix B document of *"indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories"*, project participants are required to provide a qualitative explanation to show that the project activity would not have occurred anyway, at least one of the listed elements should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing

barrier(s); The guidance provided herein has been used to establish project additionality. The barriers that were considered are listed below:

a) Investment barrier
b) Technological barrier
c) Barrier due to prevailing practice
d) Other barriers

The following paragraphs describe the principal and other barriers that may come across during implementation of project activity.

Investment barrier:

In absence of the proposed CDM project activity, GASCO – ASAB, BAB and BUHASA would have continued to send the fuel gas to burn pit/stack with existing flow rates in existing condition. The alternative proposed will reduce the fuel gas flow rates, with very high investment at each site for complete burn pit, associated equipments and instruments. To prove the project is financially additional, GASCO has carried out a financial analysis using Net present value analysis and has carried out sensitivity analysis to see the robustness and deviation pattern after increasing and decreasing parameters which are sensitive to change. Investment Inputs of the projects are:

Capital cost:

ASAB	BAB	BUHASA
5 Million USD	7.3 Million USD	8.7 Million USD

The price GASCO pays for the fuel gas is: 1.089 USD / SCM.

The NPV of the proposed project activity without CDM revenues is estimated for 15 yrs with inputs as:

A sensitivity analysis was conducted by altering the following parameters:

- Fuel Price to be ± 5% and ± 10%

The impact on the project financial results is given below, Table B.5 indicate influence of various changes in by changing key parameter on the project's NPV.

Table B.5: Sensitivity Analysis

Sensitivity Parameters	**-10%**	**-5%**	**0**	**5%**	**10%**
Fuel price	0.980	1.035	1.089	1.143	1.198
NPV	-4,349,125	-3,544,116	-2,739,107	-1,934,098	-1,129,089

From the NPV analysis conducted, it is evident that NPV of the project is negative in every year based on the fuel gas prices and therefore clearly demonstrate a low financially/unattractive project. The project is considered only an environmental initiative and does not have financial benefits. CDM incentive would provide a drive or impetus for such environmental initiative and may make it feasible.

Technological barrier:

GASCO's Asab industrial facility had introduced a pilot study with velocity seals on burn pit "B". This was the first time velocity seals were introduced in GASCO and the UAE as a whole. The result from this pilot study were not encouraging and the velocity seals operation had faced problems like rupturing of seals, burn back and thus reduction of gas could prove deleterious of process operations[5]. This shows the technology modification that were tested at Asab had uncertainties and is still unproven technology in this region and therefore involves a big technical risk for GASCO and its industrial sites.

Even after the failure, GASCO has taken the risk and is going ahead to implement the energy conservation devices to reduce fuel gas flows required to prevent air infiltration into the burnpits/stacks[6]. So the installation of velocity seals is purely an initiative to conserve energy, and thus the environment. These factors prove the technical hurdles that were faced by GASCO even before actual implementation of the project.

Even after these implementation risk and continuous operation risk foreseen, GASCO sites have invested time, effort and financial resources to implement velocity seals. Some every important technical challenge that are foreseen even after implementation of velocity seals are:

1. Technical Man power training: Humans are always involved in operating the system and being an Oil and Gas industry it very important for industry to have a knowledge update work force. After implementing velocity seals, associated equipments and instruments and real time monitoring system (DCS) training will be required which requires some time to understand and assimilate the new technology and system procedures. Any mistake during this transit time may pose a risk of interruption to plant operation. In case of Gasco sites, a plant trip at a Gasco NGL site will also

[5] Please refer to the difficulties and uncertainties faced by GASCO during the implementation of pilot study are given in Root Cause Analysis (RCA) Investigation report.

[6] API Recommended Practice

affect the production at upstream ADCO facilities – with additional environmental & economic impact.

2. As the measure will be implemented at each site and on each burn pit certain parameters like temperature and volume flows have to be monitored continuously and real time through a DCS system. So the efficienct monitoring requires a new equipments and instruments which will be linked and looped with the new automation and Distributed Control System (DCS) so have integrity with operations. This implementation of automation and feedback system is intricate and posses a challenge in implementation in gas processing facility like ASAB, BAB and BUHASA.

Any of these above mentioned risks can lead to downtime in production and pose technical difficulty in upstream and downstream operation the plant process.

Barrier due to prevailing practice:

The prevailing practice is to operate burnpits/stacks without velocity seals. The pilot project in GASCO that was introduced to test out the technique under local conditions was used in UAE for the first time. Utilization of fuel gas is not subject to any regulation; there is currently no UAE Federal legislation, as prepared by the Federal Environmental Agency (FEA), which deals strictly with pollution prevention and control. The FEA supports and encourages 'Cleaner Production' initiatives and environmental protection and the controls to achieve these via emissions, discharges, waste streams, transportation, etc. are covered in various items of UAE legislation including The Federal Environmental Agency Federal Law number 24 and the State Environment Agency Law number 21. None of these restricts the amount of flaring in GASCO's NGL extraction facilities. ADNOC has a Code of Practice (COP) that GASCO has to comply to. This COP sets a "zero flaring" target for all operating companies, but there is no limit on the amount of gas that can be sent to burnpits/stacks in GASCO[7]. Continuation of current practice is thus in compliance with all applicable legal and regulatory requirements of the United Arab Emirates.

B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

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According to the selected methodology the baseline is defined as:

[7] ADNOC HSE manual of codes of practice Volume 2: "Code of practice on pollution prevention and control" (ADNOC-COPV2-02)

"In case of replacement, modification or retrofit measures, the baseline consists of the energy baseline of the existing facility or sub-system that is replaced, modified or retrofitted." .." Each energy form in the emission baseline is multiplied by an emission coefficient. ".." For fossil fuels, the IPCC default values for emission coefficients may be used."

Based on this guidance, the baseline emissions are defined as following:

Baseline emissions:

The baseline emissions are determined as following:

(1) $$BE_x = \left(V_{x,NG} \; x \, C_{NG} \; x \, 10\text{^}6 \, x \frac{44}{12} \right)$$

Where:

BE_x	Baseline emissions during the year x (t CO_{2e}/yr)
$V_{x, BE}$	The volume of fuel gas consumed in baseline during year x (MMSCM) in a year
C_{NG}	Carbon content in fuel gas (tC/SCM)

Project emissions:

Project emissions are defined as the emissions after installation of velocity seals and reduction fuel gas quantities in the project boundary after implementation of the project activity. The amount of fuel gas utilized in any year y during the crediting period is monitored by use of flow meters with high accuracy levels. Project emissions are calculated as:

(2) $$PE_y = \left(\sum_i V_{y,NG} \cdot x \, C_{NG} \; x \, 10\text{^}6 \; x \cdot \frac{44}{12} \right)$$

Where:

PE_y	Project emissions during the year y (t CO_{2e}/yr)
$V_{i, PE}$	The volume of fuel gas reduced after project implementation at each site (MMSCM) in a year
C_{NG}	Carbon content in fuel gas (tC/SCM)

Leakage:

The energy efficiency technology is not transferred from another activity, and the existing equipment will not be relocated as part of the project activity. Leakage is thus set to zero.

Emission reductions:

(3) $$ER_y = BE_y - PE_y$$

Where:

ER_y	Emission reductions achieved during the year y (t CO_{2e}/yr)
BE_y	Baseline emissions during the year y (t CO_{2e}/yr)
PE_y	Project emissions during the year y (t CO_{2e}/yr)

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

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Data / Parameter:	$V_{X,NG}$
Data unit:	MMSCM
Description:	Million Standard Cubic Meter
Source of data used:	Historical data for fuel gas from year 2004 to 2006 from GOMES
Value applied:	**S.No** / **GASCO Plant** / **Baseline fuel gas Volume data (MMSCM)** 1 / Asab / 6.85710 2 / Bab / 7.35600 3 / Buhasa / 8.68100 **Total Flow** / **22.89410**
Justification of the choice of data or description of measurement methods and procedures actually applied :	Justification to choice of data: Data for each value applied from the table is based on the historical data taken from ASAB, BAB and BUHASA sites. Measurement method and Procedures applied: • Each site has burn pit with flow meters (local) and flow meter on header of each fuel gas line. • Measurement was carried by direct monitoring through local spot and collection in existing GOMES software and database.
Any comment:	-

Data / Parameter:	C_{NG}
Data unit:	tC/SCM
Description:	Carbon content of fuel gas
Source of data used:	Gas chromatography analysis
Value applied:	0.000536
Justification of the choice of data or description of measurement methods and procedures actually applied :	Justification to choice of data: Carbon content is emission reduction calculation parameter Measurement method and Procedures applied: • Gas chromatography analysis at GASCO – ASAB, BAB and BUHASA.
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

Baseline emissions:

By applying the data presented in table 3 and in Annex 3, the baseline emissions can be calculated as:

(4) $$BE_X = \left(22.894*10\text{^}6\, x\, 0.000536\, x \frac{44}{12} \right)$$

Project emissions:
The project emissions are calculated based on the projected fuel gas consumption as specified by the velocity seal vendors. Based on the consumption estimates presented in Table 1, the project emissions are calculated as:

(5) $$PE_Y = \left(18.536*10\text{^}6\, x\, 0.000536\, x \frac{44}{12} \right)$$

Emission reduction:
The emission reductions are estimated to be:

(6) $$ER_y = 44{,}995 - 36{,}430 = 8{,}565\, tCO_2$$

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

ASAB:

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions in tonnes of (tCO_{2e})
2009	12,172	13,476	0	1,305
2010	12,172	13,476	0	1,305
2011	12,172	13,476	0	1,305
2012	12,172	13,476	0	1,305
2013	12,172	13,476	0	1,305
2014	12,172	13,476	0	1,305
2015	12,172	13,476	0	1,305
2016	12,172	13,476	0	1,305
2017	12,172	13,476	0	1,305
2018	12,172	13,476	0	1,305
Total estimated reductions (tonnes of CO_{2e})	**121,720**	**134,760**	0	**13,050**
Total number of crediting years	**10**	**10**	**10**	**10**
Annual average over crediting period of estimated reductions (tonnes of CO_{2e})	**12,172**	**13,476**	**0**	**1,305**

BAB:

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions in tonnes of (tCO_{2e})
2009	7,747	14,457	0	6,710
2010	7,747	14,457	0	6,710
2011	7,747	14,457	0	6,710
2012	7,747	14,457	0	6,710
2013	7,747	14,457	0	6,710
2014	7,747	14,457	0	6,710
2015	7,747	14,457	0	6,710
2016	7,747	14,457	0	6,710
2017	7,747	14,457	0	6,710
2018	7,747	14,457	0	6,710
Total estimated reductions (tonnes of CO_{2e})	**77,470**	**144,570**	**0**	**67,100**
Total number of crediting years	**10**	**10**	**10**	**10**
Annual average over crediting period of estimated reductions (tonnes of CO_{2e})	**7,747**	**14,457**	**0**	**6,710**

BUHASA:

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions in tonnes of (tCO_{2e})
2009	16,510	17,061	0	551
2010	16,510	17,061	0	551
2011	16,510	17,061	0	551
2012	16,510	17,061	0	551
2013	16,510	17,061	0	551
2014	16,510	17,061	0	551
2015	16,510	17,061	0	551
2016	16,510	17,061	0	551
2017	16,510	17,061	0	551
2018	16,510	17,061	0	551
Total estimated reductions (tonnes of CO_{2e})	**165,100**	**170,610**	**0**	**5,510**
Total number of crediting years	**10**	**10**	**10**	**10**

Annual average over crediting period of estimated reductions (tonnes of CO_{2e})	**16,510**	**17,061**	**0**	**551**

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

B.7.1 Data and parameters monitored:

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The data parameters monitored will be same for ASAB, BAB and BUHASA

Data / Parameter:	**$V_{y, NG}$**
Data unit:	MMSCM
Description:	Million Standard Cubic Meter
Source of data to be used:	GOMES database
Value of data applied for the purpose of calculating expected emission reductions in section B.5	**S.No** / **GASCO Plant** / **Project Activity Gas Volume (MMSCM)** 1 / Asab / 6.193320 2 / Bab / 3.942000 3 / Buhasa / 8.400840 **18.536160**
Description of measurement methods and procedures to be applied:	Data type: Measured at each burnpit from ASAB, BAB and BUHASA Recording Frequency: Recorded daily at each burn pit Data Archiving Policy: Paper & Electronic Monitoring procedure: a. Data will be measured using flow meters with feedback loop system which monitors real time data with DCS system and GOMES database. Calibration Frequency and Procedures: ❖ Calibration frequency of flow meter and associated equipments will be carried our periodically as per GASCO ISO standard implemented.
QA/QC procedures to be applied:	As per ISO procedures of GASCO
Any comment:	Data will be archived for two years following the end of the crediting period.

Data / Parameter:	**$C_{y, NG}$**
Data unit:	tC/SCM
Description:	Metric tonnes of carbon content in fuel gas
Source of data to be used:	Based on gas chromatography analysis at at ASAB, BAB and BUHASA
Value of data applied	0.000536

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Data type: Measured at ASAB, BAB and BUHASA Recording Frequency: Recorded daily Data Archiving Policy: Paper & Electronic Monitoring procedure: b. Data will be measured using gas chromatography test method internally at GASCO and if required from third party laboratory testing facility. Calibration Frequency and Procedures: ❖ Calibration frequency is based on the internal ISO procedures at GASCO sites.
QA/QC procedures to be applied:	As per gas chromatography standard and test method.
Any comment:	Data will be archived for two years following the end of the crediting period.

B.7.2 Description of the monitoring plan:

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According to ASM-II.D., the monitoring shall in the case of replacement; modification and retrofit measures consist of:

(a) *Documenting the specifications of the equipment replaced;*

(b) *Metering the energy use of the industrial or mining and mineral production facility, processes or the equipment affected by the project activity;*

(c) *Calculating the energy savings using the metered energy obtained from sub-paragraph (b).*

The fuel gas reduced will be monitored continuously and the energy saving will be calculated based on the difference between this monitored use of fuel gas and the historic use of fuel gas.

Data collection and verification

Data to be collected for the purposes of monitoring of the CDM activity includes the parameter described in detail in section B.7.1. All project sites are connected to new DCS system which automatically record and store data in GOMES database. The data stored cannot be modified or tampered as system has inbuilt security features. However an overview of data maintenance will remain with the operational team at each site. The operational team will directly report to focal point which is Environment and Energy co-ordinator. GASCO environment coordinator will in turn report to AGMT. All procedures for monitoring and report generation will be audited and maintained as per ISO procedures. GASCO Env & Energy co-ordinator will be responsible for making all relevant information available for verification procedures. Finally a yearly monitoring sheet can shared with MASDAR for backup purpose.

Data storage and archiving

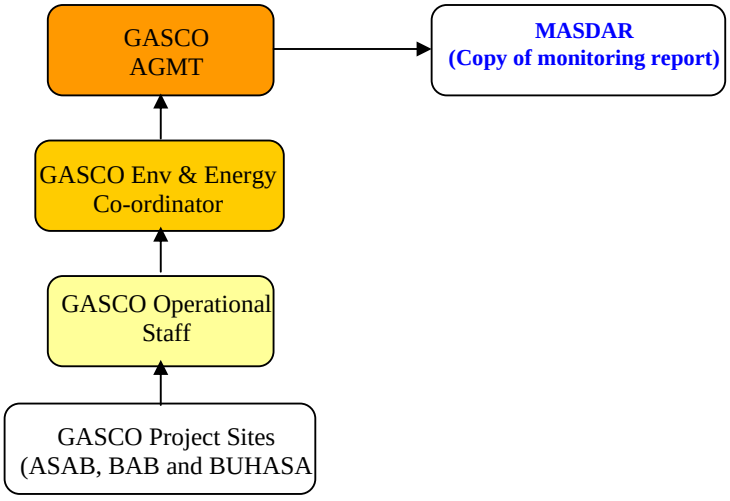
All data will be archived electronically and stored on site. Continuously monitored values are stored in ASAB, BAB and BUHASA GASCO's DCS control system, where hourly data are stored for a period of 10 years of crediting period + 2 years additionally post credit period. An electronic copy of all relevant data aggregated on a monthly basis will be sent along with the monthly report to MASDAR.

Maintenance and calibration of instruments

GASCO Env and Energy co-ordinator will be associate with operational team for ensuring all relevant monitoring and measurement equipment is maintained properly and calibrated according to the frequency presented in Section B.7.1. The Maintenance and Instrumentation department, represented by the planning unit, will instruct the operators to carry out maintenance and calibration at regular intervals, and the operational staff will issue a report to the planning unit when this is done. An annual report will be sent to Masdar, detailing when all relevant monitoring and measurement equipment was last calibrated for quality control.

Data Management structure for CDM project monitoring plan

According to the above, the management structure put in place for data collection, handling and control can be summarised as follows:



CDM Staff training

Prior to starting up project monitoring, training of relevant staff will be provided as follows:

Relevant staff:	**CDM related training:**
GASCO Operational staff	Data collection and Coordination Storage and archiving Publication for verification
GASCO Environment and Energy Co-ordinator	Quality Assurance and Audits
GASCO AGM(T)	Overview

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

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Date of Completion of application of baseline and monitoring methodology:
22/04/2008

Name of responsible person: GASCO and their associated experts

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:

>>
BUHASA – 20/02/2008
BAB - 20/10/2007
ASAB – 20/10/2007

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

>>
10 years

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

>>
Fixed

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:

>>
31/09/2008 or date of registration as per UNFCCC, which ever most earlier and relevant.

C.2.2.2. Length:

>>
10 years 0 months

SECTION D. Environmental impacts

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D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

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The objective of this project is to preserve natural resources and thus reduce GHG emissions by utilizing less fuel gas in burnpits/stacks. The main positive environmental impact is that the project will help mitigate the effects of global warming and potentially substitute fossil fuels with a higher CO_2 emission factor at end-users (e.g. power plants running on liquid fuels). Reduced fuel gas to burn pits will have a positive effect on the local environment and health conditions of humans and animals living in the area, e.g. through reduction of thermal pollution and particulates. The project activity implies a strong focus on environmentally sound operations, and could potentially have benefits in improving awareness and management of other pollutants as well. The ADNOC regulation specifies that an Environmental Impact Assessment (EIA) has to be carried out for all NGL Extraction Plants. Such EIA's have been carried out for all GASCO's plants. There is, however, no requirement to carry out an EIA for a specific project activity within a facility.

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:

>>

No negative environmental impacts are expected from the project activity and an environmental impact assessment is not required by UAE.

SECTION E. Stakeholders' comments

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

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The identified lists of stakeholder by GASCO are:

1. Employees
2. Consultant
3. Contractors
4. Suppliers

The project activity presented is a small scale project with stakeholders limited to the ASAB, BAB and BU HASA site. The management has informed the staff about the project. The personnel that are most directly affected by the project activities are the staff working in the control room and the staff responsible for maintenance. None of these stakeholders had any objectives to the project.

E.2. Summary of the comments received:

>>

The stakeholder meeting for CDM project on project was held at the GASCO facility with representatives each stakeholder attended the meeting. A brief summary of all comments received is given below.

Employees:

The project only concerns the staff working at GASCO (ASAB, BAB and BUHASA). The employee staff was informed about the project via the Internal news letter and notice displays. Summary of all positive comments received are given to the DOE.

Consultant:

Project consultants who will be involved in the project will take care of various EPC and post contract project activities. This involves preparation reports, engineering design documents, selection of vendors/suppliers, selection of supervisors in project implementation, commissioning etc. Because of these activities benefits and greater understanding would be realized once the project is implemented.

Equipment Suppliers:

Equipment suppliers will be supplying equipments as per the specifications finalized for the project and are responsible for timely erection, installation and commissioning of same at the sites.

To summarizes all the stakeholders have complimented and appreciate the effort taken for reducing fuel gas which will eventually help in reducing GHG emissions and protect environment both working and global. The activity will also generate benefits for consultants and equipment suppliers because of the

project activity. Lastly, the end used both domestic and industrial user will get additional energy required as per the growing demand and needs.

Thus the project activity envisages providing both short term and long term benefits to local population

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

>>

No negative comment was received during the stakeholder consultation process.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	The Abu Dhabi Gas Industries Ltd, (GASCO)
Street/P.O.Box:	P.O.Box 665, Abu Dhabi, UAE
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URL:	http://www.gasco.ae
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Al Rumaithi
Middle Name:	Mohamed
First Name:	Ahmed
Department:	Environmental & Energy Efficiency
Mobile:	-
Direct FAX:	-
Direct tel:	-
Personal E-Mail:	-

Organization:	Abu Dhabi Future Energy Company (MASDAR)
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State/Region:	Abu Dhabi
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Represented by:	Carbon Management Unit
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Salutation:	Mr.
Last Name:	Al Ali
Middle Name:	-
First Name:	Yousif
Department:	Carbon Management

Mobile:	-
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Direct tel:	+971 2 698 8180
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding(s) is available for the project activity

Annex 3

BASELINE INFORMATION

Historical Baseline fuel data for ASAB, BAB and BUHASA for year 2004-2005, 2005-2006 and 2006 – 2007

All values in MMSCM

2004	ASAB	BAB	Bu Hasa
Jan	0.217	0.746	0.758
Feb	0.203	0.648	0.799
Mar	0.256	0.380	0.994
Apr	0.195	0.520	0.491
May	0.202	0.620	0.679
Jun	0.195	0.600	0.855
Jul	0.202	0.620	1.187
Aug	0.202	0.620	1.064
Sep	0.195	0.600	0.926
Oct	0.202	0.620	0.847
Nov	0.195	0.600	0.670
Dec	0.202	0.620	0.607
Total	**2.463**	**7.194**	**9.877**

2005	ASAB	BAB	Bu Hasa
Jan	0.202	0.622	0.837
Feb	0.196	0.560	0.986
Mar	0.203	0.627	0.827
Apr	0.195	0.600	0.867
May	0.202	0.620	1.220
Jun	0.195	0.600	1.291
Jul	0.202	0.620	0.953
Aug	0.202	0.620	0.870
Sep	0.195	0.600	0.742
Oct	0.202	0.620	0.804
Nov	0.195	0.640	0.758
Dec	0.202	0.620	0.781
Total	**2.388**	**7.349**	**10.936**

2006	ASAB	BAB	Bu Hasa
Jan	0.222	0.620	0.778
Feb	0.221	0.570	0.722
Mar	0.371	0.660	0.790
Apr	0.425	0.600	0.849
May	0.414	0.620	0.765
Jun	0.383	0.600	0.720

Jul	0.812	0.620	0.740
Aug	0.812	0.626	0.630
Sep	0.786	0.600	0.639
Oct	0.813	0.620	0.687
Nov	0.786	0.600	0.666
Dec	0.812	0.620	0.695
Total	**6.857**	**7.356**	**8.681**

The composition of the fuel gas is defined to be as following:

Design conditions for burn pit (GASCO EPC Tender No. PE.09.06)		
Composition of fuel gas	**Component**	**Mole %**
	Nitrogen	0.46
	Methane	89.53
	Ethane	5.77
	Propane	0.25
	Butane	0.00
	Pentane	0.00
	C6+	0.00
	CO_2	3.99
	H_2S	50 ppm
Net Calorific Value (GWh/SCF)		$2.967*10^{-7}$
Carbon Intensity Fuel (kg C/MJ)		0.014
Carbon Content (kg C/Nm^3)		**0.536**
Mass fraction of methane (kg CH4/kg)		**79.38**

Annex 4

MONITORING INFORMATION

Each project site ASAB, BAB and BUHASA have new burn pits which will associated with complete equipments and automation system which is proposed to be hooked with the DCS system. The data will be available online and recorded and stored in GOMES which is software and database at each site. Therefore total volumetric flows for each site can be monitored on a real time basis.

As the project is proposed at three locations ASAB, BAB and BUHASA, every site will have a organization structure for monitoring. The monitoring team comprises of review and recording team, who then will collate the data at the end of every year. ISO procedures will be applied and maintained to check data quality and control by these teams.

All flow meters and associated instruments will be monitored and calibrated on routine basis to promote data quality.

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